

RETENTION OF HISTORY
IN THE
SIXTH, SEVENTH AND EIGHTH GRADES
WITH
SPECIAL REFERENCE TO THE
FACTORS THAT INFLUENCE
RETENTION

BY
SARAH JANET BASSETT

A DISSERTATION

submitted to the Board of University Studies of The Johns Hopkins University in conformity
with the requirements for the degree of Doctor of Philosophy.

JUNE, 1928



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S. J. B.

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CHAPTER 1

THE PROBLEM AND THE PLAN OF THE INVESTIGATION

A. THE PROBLEM

The purpose of the present study is to measure the retention of history by pupils in the sixth, seventh and eighth grades with special reference to the factors that influence retention.

The investigation attempts to answer the following important questions:

1. How much history knowledge gained in the classroom is retained after various intervals of time—four to sixteen months? Why?

2. What is the curve of forgetting for sixth, seventh and eighth grade history?

3. What is the best time to give reviews and examinations? Why?

4. Are there any significant grade differences in the retention of history?

5. Does time influence the relative standing of grammar school or junior high school pupils?

6. What kinds of history knowledge are retained and what kinds are forgotten?

7. What is the influence of sex on history retention?

8. What factors are significant of ability to retain history?

9. What are some of the practical applications of these findings to (a) life of the school, (b) methods of teaching, learning and pupil participation, and (c) the school studies, or curriculum?

Few, indeed, are the subjects of experimental education which have attracted more attention than "retention" and "forgetting." Long ago, the German philosophers began to teach, "That, not the persistence of ideas which have always been in consciousness, but, the forgetting of them requires special explanation." Forgetting, according to these thinkers, is the great mystery.

Throughout the literature on retention, we find wide variations of results. Yet, more and more, the mystery of forgetting is being unravelled by scientific investigation. One cannot but be satisfied with the many contributions made by the retention studies, all the way from the classic work of Ebbinghaus to that of McGeoch, reported in March, 1928.

Nevertheless, we find Thorndike (1922) setting forth statements of vital consequence, when he writes, "It is common, in discussions of educational values, to use the alleged fact that we soon forget most of what we learned in school. . . . So far as I can ascertain, nobody has ever measured the extent of this actual forgetting,"¹

B. PLAN OF THE INVESTIGATION

1. *Selection of the Children*

In order to secure the data necessary to determine the retention of history in the sixth, seventh and eighth grades with special reference to the factors that influence retention, five public schools in different sections of Baltimore City were selected as experiment centers. These pupils were taught by 12 different teachers. As for the subjects themselves, they are typical children of large city schools, since they were especially selected to cover wide ranges of intelligence levels, grade progress, chronological ages, interest and effort.

Table I shows the groups in the different grades that were studied in this investigation. There are 1364 sixth, seventh and eighth grade children, of which number 729 are boys and 635 girls. Another interesting fact about these pupils is the grade progress, since 397 make rapid progress, 457 normal progress, and 510 slow progress. After all, the figures given in Table I are about typical of the rate of grade progress for our city school pupils.

The children were given history tests, devised by the experimenter, at four-month intervals; namely, January, May

¹Thorndike, E. L.: *The Permanence of School Learning*. School and Society, Vol. 15, pp. 625-27, 1922.

and September from 1926 to 1928. As soon as VI B² class finished the history work called for in the Baltimore City Course of Study in History, the children were given the VI B test. After an interval of four months, or eight months in some instances, the same class was again tested on the VI B work. In the meantime, when they completed the VI A work, they were given the VI A test at the stated intervals. In similar fashion, the cycle progressed for all the groups in the grades shown in Table I.

Anyone who has conducted an investigation over a considerable length of time, with the same children, has faced the problem of the elimination of large numbers of these boys and girls. Especially is this true where there are many promotions and a few, let us hope, non-promotions in January and June. A great number of our city families move about, while some children leave school to seek employment. It so happened that of the children who took the tests after the four-month interval, smaller numbers of these were available for the test on the eight-, twelve- or sixteen-month interval. In one of the junior high schools, only 65 out of an initial 150 children could be secured for the four-month retest. Consequently, when it is stated that 1364 children are included in this study, it must be remembered that these include some of the combined groups. When we consider the separate and distinct groups in this study, there are 810 cases, of which number 421 are boys and 389 are girls. Of the 1364 pupils, 72 cases supplied the evidence for practice effect, 63 cases the amount of history known before the particular grade work was taught, and the remaining 1229 cases gave the data for retention. All of these groups, along with the number of boys and girls in each, and with the grade progress, are shown in Table I.

² VI B is the lower division of a grade while VI A is the higher or second half of the grade; that is, a child who makes normal progress spends one semester in VI B and is then promoted to VI A.

TABLE I
NUMBERS AND PERCENTAGES OF PUPILS MAKING RAPID, NORMAL, AND SLOW GRADE PROGRESS
N = 1364

Re. Tests ¹	Grade	No. of cases	Boys	Girls	Rapid progress		Normal progress		Slow progress	
					No. of cases	%	No. of cases	%	No. of cases	%
"	VIB	30	14	16	13	43.33	9	30.00	8	26.67
"	VIB	28	18	10	2	7.14	6	21.43	20	71.43
"	VIA	122	70	52	47	38.52	41	33.61	34	27.87
"	VIA*	86*	50	36	29	33.72	30	34.88	27	31.40
"	VIA*	44*	29	15	9	20.45	17	38.64	18	40.91
"	VIB	167	94	73	51	30.54	42	25.15	74	44.31
"	VII†	107†	57	50	48	44.86	24	22.43	35	32.71
"	VII†	64†	37	27	5	7.81	31	48.44	28	43.75
"	VIIA	142	69	73	35	24.65	04	45.07	43	30.28
"	VII†	120†	64	56	28	23.33	57	47.50	35	29.17
"	VIIA	86	47	39	63	73.26	15	17.44	8	9.30
"	VIII B	79	41	38	15	18.99	18	22.78	46	58.23
"	VIII B§	62§	37	25	13	20.97	14	22.58	35	56.45
"	VIII B§	44§	19	25	11	25.00	10	22.73	23	52.27
"	VIII B§	27§	15	12	9	33.33	6	22.22	12	44.45
"	VIII A	21	7	14	3	14.29	17	80.95	1	4.76
Pr. Effect ²	VII B	29	18	11	7	24.14	15	51.72	7	24.14
"	VII B	43	26	17	2	4.65	16	37.21	25	58.14
Before St. ³	VII B	32	15	17	1	3.13	16	50.00	15	46.87
"	VIII A	31	2	29	6	19.36	9	29.03	16	51.61
No. of Cases		1364	729	635	397	29.11	457	33.50	510	37.39

¹ Retention Tests.

² Practice Effect.

³ Before Study.

* Included in the groups of 122 VI A.
† Included in the groups of 167 VII B.
‡ Included in the groups of 142 VII A.
§ Included in the groups of 79 VIII B.

2. The Retention Tests

a. Construction and Criticism

In order to measure the amount of history retained, six sets of history tests were constructed—one for each of the following grades—VI B, VI A, VII B, VII A, VIII B and VIII A. The tests were based absolutely on the material outlined in the History Course of Study in the City of Baltimore. Samples of all six sets are given in the Appendix.

The large topics of the history covered in grades six, seven and eight are:

Sixth Grade

- I. Baltimore, Maryland—A Study of the Community
Yearly Topic—How Maryland Made a Name for Herself in History
- II. The American Nation
Yearly Topic—How America Became a Leader Among Nations
- III. Our Old World Heritage
Yearly Topic—What We Owe to the World of the Middle Ages

Seventh Grade: B

- I. The American Revolution and the Birth of a New Nation
- II. Organization and Foreign Affairs to 1800

Seventh Grade: A

- I. Development of the Nation to 1860

Eighth Grade: B

- I. Slavery Questions
- II. Civil War
- III. Reconstruction
- IV. Growth of the Far West

Eighth Grade: A

- I. New Industrial Age
- II. Reforms
- III. Foreign Relations

On each set of tests, there are 40 true-false, 10 completion, 20 multiple-choice, and a choice of three out of four modified essay questions. In preparing these tests, many facts had to be kept in mind. First, among these, was the necessity of keeping a well-balanced choice of the topics called for in the History Course of Study. That is, if there are four major topics, then a fourth of the questions—true-false, completion, multiple-choice, and essay—must be devoted to each of the

four phases of the work. Care, also, was taken to avoid repeating the history facts in the different forms of the tests. Of course, attention was given to the vocabulary used in the questions, since double negatives, pointers, and unfamiliar words were to be eliminated.

Then, there is a question in each set which is so very easy that practically every child can answer it. Some one question, on the other hand, is so difficult that it is answered correctly by only the unusually gifted child. Thus, the questions cover wide ranges of difficulty, though not in any regular sequence.

Still, there were other difficulties in the construction of the test, for, in the preparation of the true-false questions, it seems advisable to keep the number of false statements equal to the number of true statements, though not in any fixed order. Four choices are given in each multiple-choice question; hence, out of twenty such questions, five of these correct choices are a's, five b's, five c's, and the remaining five are d's, all arranged in mixed sequence. In constructing the completion tests, consideration was given to the wording so that only one answer was acceptable. The essay questions necessitated an analysis of the high points covered in the semester's work, for these points were weighed and the questions so worded as to secure the desired information from the children with a minimum of their time and effort. As a matter of fact, the essay questions are a modified form of an objective question and are very unlike the long essay questions formerly used. Each of the essay questions calls for four statements, or phrases, as a complete answer. The first question on the true-false, completion, and multiple-choice test was answered, so as to assist the children in an understanding of what they were to do.

Several history teachers, supervisors, and administrators criticized the retention tests. In a class in Experimental Education at The Johns Hopkins University, many practical suggestions were received. The tests were given a try-out with 187 children. With due consideration of all the help thus secured, the writer tried to correct and modify the original tests.

b. Administration of the Retention Tests

The six sets of tests were mimeographed and bound. When the children finished the work called for in a certain grade, they were given the initial test. As far as possible, these tests were given at the regular examination time. With one exception, the writer gave the tests in all five schools.

After the children filled in the necessary blanks on the cover page, the experimenter read aloud and explained the directions, then the children went to work. No time limit was set; consequently, the children were neither rushed nor excited. One by one, as the minutes passed, the teacher wrote the time on the board, so that the children could write down the time which they needed to answer each type of test on the examination. When a child finished, he looked up to the board, copied the last number of minutes written there, which indicated his time on that test; then, he went on with the next part. Thus, he continued until he finished all four parts on one examination. Generally, the time for a whole test of 82 questions required from 20 to 45 minutes.

Let it be said, in passing, that no child ever expressed anything but approval of the tests, since they believed them to be fair, easily and quickly done, and on the whole they liked to take them. At no time were the scores or correct answers given to the pupils, nor did they or the teachers anticipate another retention test after an interval of four or eight months.

c. Scoring the Retention Tests

The true-false questions were scored, $\text{Score} = \text{No. Right}$. This method of scoring was adopted because the director of this investigation, Dr. Fowler Dell Brooks of The Johns Hopkins University recommended it. Dr. Karl J. Holzinger of the University of Chicago considered it the better way to score the true-false question. Of course, it is important to secure the relative standing of the children in the various classes and grades. Dr. Holzinger says, "In tests where the items may be marked true or false it is customary to score the result 'right minus wrong,' or in symbols, $S = R - W$. This method is assumed to correct for the element of guessing

which may be involved. If a person guesses on eight such questions, he would be expected to get half of them right by chance, so that his score should be zero and not four. By scoring $R-W$, this correction is evidently brought about, but it should be noted that this person could miss four out of eight items and yet do no guessing at all. He would then be unjustly penalized by the formula that implies that any error arises from two guesses. The $S=R$ formula can be used where the children are allowed to finish all the questions." Again Holzinger writes, "The relative standing of pupils is identical by the two methods, where scoring is desired it is obviously better to use the simple formula $S=R$."³

The completion questions were scored "one" if the whole question was right. No credit was given for a partially correct answer. The multiple-choice questions were each given a score of "one" if the child indicated the correct answer in any way; that is, if he underlined the correct words, or just the a, b, c, or d. This leniency was allowed because the history knowledge was the desired fact as far as this study is concerned. Although there was a possibility of making a maximum score of 82 points,⁴ yet the highest record made was 80 points.

3. Other Information on Retention

Not only were the children given tests to secure history retention in real classroom situations, but wherever possible, the same children were given tests to supply the data for the influence of certain factors on retentiveness. There are nine factors under consideration here; namely, (1) sex, (2) mental age, (3) chronological age, (4) subject preference, (5) interest and effort, (6) reading comprehension, (7) ability to answer questions on a standard history test, (8) weight, and (9) height.

Equated groups of 95 boys and 95 girls supplied the data for the difference in sex. They were chosen from three groups—VII A, VII B, and VI A.

³Holzinger, K. J.: On Scoring Multiple-Response Tests. *Journal of Educational Psychology*, Vol. 15, pp. 445-447, 1924.

⁴"Points" = raw scores.

In some cases mental age was secured by giving the McCall Multi-Mental Scale, Form I, while in others, the Illinois Examination II, Form II, was given. No attempt was made to treat the returns on an IQ basis, since the computations were based on the mental age and chronological age.

A rather simple device was employed to get the children's subject preference. At this point in the experiment, the teachers of various school studies came in to assist the securing of returns. The children listed on slips of paper the following studies: Reading and literature, arithmetic, grammar, manual training (domestic science in the case of the girls), history, hygiene, geography, music, drawing, and physical training. The question has been raised as to the wisdom of including physical training, domestic science, drawing, and music, with the strictly content studies. If we pause a moment, and leave out these studies, the relative standing of the content studies remains practically unchanged. Beside each study, the pupils wrote the figure which represented how well they liked that particular subject. The one they liked best of all received a score of 10, while the least preferred received only 1.

In order to secure adequate records for the children's interest and effort, the history teachers of the particular classes were called upon. These marks are quite significant, for they are composite scores based on how well the children paid attention, contributed to the history lesson, and participated in activities connected with history—in short, how much interested were they and how much effort had they put forth in the history classes. These interest and effort marks are closely allied to the term marks in history.

The reading comprehension scores were gotten by the use of the Monroe Standardized Silent Reading Test Revised, Test II, or by the Chapman Unspeeded Reading Comprehension Test (Grades V to XII). As a means of measuring the ability to pass a standard history test, the children were given the Understanding of American History by Pressey and Richards.

The weight and height scores were secured by the use of the Weight-Height Age Tables for Boys and Girls, which has been prepared by Bird T. Baldwin and Thomas D. Wood. The school nurses procured these physical measures.

Regardless of the time and effort involved in securing all the data for the solution of the present investigation, both the teachers and children did all they could to coöperate and thereby make the results worthwhile.

4. Practice Effect

To what extent does the practice effect necessitated by repeating the same test influence the scores? In order to solve such a problem which arose in connection with this study, two procedures were followed. The first of these consisted in giving the same test a week apart (T_0 and T_1) to 43 VII B's. The second consisted in giving the tests to another group of 29 VII B's after intervals of four weeks (T_4) and eight weeks (T_8); then T_4 and T_8 were compared with the initial test (T_0). Table II gives the means and standard deviations for these tests.

TABLE II
HISTORY SCORES FOR PRACTICE EFFECT AFTER INTERVALS OF 0, ONE, FOUR, AND EIGHT WEEKS

Time Interval Tests	GRADE VII B N = 43		GRADE VII B N = 29		
	0 Wk. T_0	1 Wk. T_1	0 Wk. T_0	4 Wk. T_4	8 Wk. T_8
Mean	46.51	46.37	66.51	66.27	66.03
S D *	9.11	9.37	4.39	5.09	4.80

* Standard deviation.

From T_0 to T_1 the mean for the 43 VII B's drops .14. The mean for the 29 VII B's shows a slight drop of .24 from T_0 to T_4 , and from T_0 to T_8 it drops .48. Not very much, yet there is no gain, even though the tests were given only a few weeks apart. One might argue, that the loss may have been more pronounced if practice were not the constant influence for higher retentiveness. The answer is that the means for the two methods of ascertaining practice effect do not show any gain over the initial test. For the 43 VII B's the S D

for T_0 is 9.11 and for T_1 is 9.37. The S D for the 29 VII B's on T_0 is 4.39, on T_4 is 5.09, and on T_8 is 4.80. Consequently, the scores on the initial tests are slightly more compact than after intervals of time have elapsed.

What is the relative standing of the pupils on the different tests for practice effect? Table III gives the Pearson r 's between the tests.

TABLE III

COEFFICIENTS OF CORRELATION BETWEEN THE INITIAL TEST (T_0), AND THE TESTS AFTER INTERVALS OF ONE, FOUR, AND EIGHT WEEKS

Cases	$r_{T_0T_1}$	$r_{T_0T_4}$	$r_{T_0T_8}$	$r_{T_4T_8}$
VII B-43	.903			
VII B-29		.639	.667	.670

According to Table III, there is a correlation of .903 between T_0 and T_1 for 43 VII B's. Therefore, the children who made high scores on the initial test have practically the same relative high records on the test after a week's interval. The Pearson r for the 29 VII B's between T_0 and T_4 is .639, and between T_0 and T_8 is .667. High and positive correlations are, therefore, found between the tests for practice effect.

The amount of practice effect was small, as might be expected, since the children are familiar with standardized tests and new types of examinations.

Another element making for a lowered practice effect is that these children have taken eight or nine standard tests—intelligence, reading, arithmetic, language, and spelling. Hence, a history test is only one more test and does not excite any undue apprehension or worry on the part of these experienced test-takers.

5. Amount of History Known Before and After Study

To measure the amount of history which children know before they are actually taught the content called for in a particular grade, two classes were chosen; one of those consisted of 31 VIII A's while in the other there were 32 VII B's. Both classes were in the same large city school but each had a different teacher. In selecting these groups, the writer

paid attention to the intelligence levels, grade progress, chronological age, and achievement. Not only were the classes similar in these respects, but they represented average pupils in the seventh and eighth grades.

The experimenter tested the children a few days after school opened in September, 1927. At this time, when neither class had been taught any of the history for that particular grade, the 31 VIII A's made an average of 10.70 points and the 32 VII B's an average of 10.40 points. Table IV gives these facts.

TABLE IV				
SCORES TO SHOW AMOUNT OF HISTORY KNOWN BEFORE AND AFTER TEACHING				
Grade	VIII A	VIII A	VII B	VII B
No. of Cases	31	30	32	27
Time Tested	Before study	After study	Before study	After study
Mean	10.70	39.33	10.40	39.70

The evidence revealed by these tests before the pupils have studied the grade history is significant. Obviously, averages of 10.70 and 10.40 are so low that the overlapping of the history content for the different grades is negligible. History is such an interesting subject for some children that they learn a considerable amount by supplementary reading and study undertaken on their own initiative. However, such is not true of these two classes.

At the end of the semester when the pupils had been taught the grade history, only 30 VIII A's and 27 VII B's were available for the retest. On this occasion, the VIII A's made an average of 39.33 points and the VII B's an average of 39.70 points. We are again impressed by the closeness of these two measures of central tendency.

CHAPTER 2

AMOUNTS OF HISTORY RETAINED AND FORGOTTEN

A. MEANS, STANDARD DEVIATIONS AND PER CENTS. OF HISTORY RETAINED

To find out the amount of history retained, 1229 Baltimore city school children in the sixth, seventh and eighth grades were tested. Twelve different teachers in five schools taught these pupils. After intervals of four, eight, twelve and sixteen months, the same children were retested. The examinations were given in January, May, and September, 1926 to 1928.

Table V gives the means, standard deviations, and per cents for the sixteen different groups of pupils, for the initial tests, and for the tests after intervals of four, eight, twelve, and sixteen months.¹

An examination of Table V shows that the means for the initial test (T_0), immediately after the children have finished the semester's history are consistently high. The lowest mean for T_0 is 49.50 for 30 VI B's, while the highest is 65.23 for 62 VIII B's. These means are of consequence, when we recall that 82 is the highest possible score on a test. Samples of the retention tests are given in the Appendix. The standard deviations (S D's) range from 6.32 for 21 VIII A's to 13.93 for 64 VII B's. These standard deviations would give something like a normal surface of distribution.

The means for the retention tests are constantly less after a lapse of four months (T_4) than at the time of first testing, yet, the four-month interval is a rather long time. In this instance, the lowest score for T_4 is 43.66 for 44 VI A's, while the highest mean score is 54.37 for 120 VII A's. The S D's for T_4 range from 6.72 for 21 VIII A's to 12.15 for 44 VIII B's. Thus, the 21 VIII A's cluster more closely around a central tendency than the 44 VIII B's.

¹ Distribution of scores for the retention tests are given in the typed copy of the dissertation at The Johns Hopkins University.

TABLE V

MEANS, STANDARD DEVIATIONS (S D) AND PER CENTS. FOR THE INITIAL RETENTION HISTORY TESTS (T ₀), FOR THE TESTS AFTER LAPSES OF FOUR MONTHS (T ₄), EIGHT MONTHS (T ₈), TWELVE MONTHS (T ₁₂), AND SIXTEEN MONTHS (T ₁₆).																
		V I B	V I B	V I A	V I A*	V I A*	V I I B	V I I B†	V I I B†	V I I B†	V I I A	V I I A	V I I I B‡	V I I I B‡	V I I I B‡	V I I I A
		N=30	N=28	N=122	N=86	N=44	N=167	N=107	N=64	N=142	N=120	N=86	N=79	N=62	N=44	N=27
Mean	T ₀	49.50	53.36	53.32	54.40	52.90	50.16	55.14	56.56	59.94	61.13	60.13	61.90	65.23	58.43	63.93
S D	T ₀	10.59	9.31	8.28	7.92	8.25	13.22	12.46	13.93	9.58	9.80	9.45	10.38	7.83	11.17	8.38
%	T ₀	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Mean	T ₄	45.90	46.07	46.30	43.66	43.70	47.26	47.58	47.58	53.80	54.37	50.52	50.52	53.02	47.32	51.00
S D	T ₄	9.35	9.24	9.32	9.16	11.47	10.02	11.81	10.23	10.73	10.73	11.23	11.23	9.90	12.15	11.24
%	T ₄	92.73	86.40	85.11	82.53	87.12	85.71	84.13	89.76	88.94	88.94	81.63	81.63	81.28	80.99	79.78
Mean	T ₈	43.27	44.86	43.04	43.72	41.50	43.82	44.74	44.74	50.20	50.60	51.51	51.51	44.11	44.11	47.78
S D	T ₈	9.19	8.52	9.05	9.35	9.01	10.63	11.53	11.53	9.68	10.15	8.87	8.87	12.58	12.58	11.33
%	T ₈	87.42	84.07	80.72	86.37	78.55	79.47	79.10	83.75	82.78	82.78	85.66	85.66	75.49	74.74	84.59
Mean	T ₁₂	41.37	41.19	41.19	38.79	38.79	40.73	40.73	40.73	48.58	48.58					
S D	T ₁₂	9.46	10.44	10.44	10.41	10.41	11.28	11.28	11.28	10.55	10.55					
%	T ₁₂	83.58	75.72	75.72	73.33	73.33	72.02	72.02	72.02	79.47	79.47					
Mean	T ₁₆	39.53	37.48	37.48	37.48	37.48	39.03	39.03	39.03							
S D	T ₁₆	9.86	11.16	11.16	11.16	11.16	11.22	11.22	11.22							
%	T ₁₆	79.86	70.85	70.85	70.85	70.85	69.01	69.01	69.01							

* Included in the group of 122 VI A pupils.

† Included in the group of 167 VII B pupils.

‡ Included in the group of 142 VII A pupils.

§ Included in the group of 79 VIII B pupils.

After intervals of eight months, the means range from 41.50 for 44 VI A's to 51.51 for 86 VII A's. Another important fact about the 86 VII A's, as well as the 28 VI B's, is that they are given only the initial and the eight-month interval tests. Yet, the means for these two groups after an interval of eight months are similar to the groups that had both the four- and eight-month tests. Such a similarity is worthy of note, for it shows not only an absence of practice effect, but that the groups given the eight-month retention tests are very representative of the other groups. By turning to the S D's for T_8 , they reveal a range from 6.31 for 21 VIII A's to 12.58 for 44 VIII B's.

On the retention tests after an interval of twelve months (T_{12}), the lowest mean is 38.79 for 44 VI A's and the highest is 48.58 for 120 VII A's. And the lowest S D is 9.46 for 30 VI B's, while the highest is 11.28 for 64 VII B's. These S D's are not too large to give something like a normal distribution.

Finally, the means for the three groups examined after the 16-month interval are very similar, since they range from 37.48 for 44 VI A's to 39.53 for 30 VI B's. Consequently, we may conclude after studying history, the mean amounts retained are very much alike, regardless of the large differences in the means on T_0 . Here, also, the S D's are similar, for the lowest is 9.86 for 30 VI B's and 11.22 for 64 VII B's. Thus, the 30 VI B's have scores that are more compact than the 64 VII B's.

Table VI gives the mean of the raw scores and per cents. of the amounts retained by all the pupils available for the initial test and on the tests after intervals of four, eight, twelve and sixteen months.

TABLE VI

AMOUNTS AND PER CENTS. OF HISTORY RETAINED BY ALL THE CASES
ON THE INITIAL TEST, AND AFTER INTERVALS OF FOUR,
EIGHT, TWELVE, AND SIXTEEN MONTHS

	0 Mo.		4 Mo.		8 Mo.		12 Mo.		16 Mo.	
	Amt.	%	Amt.	%	Amt.	%	Amt.	%	Amt.	%
Mean	56.78	100	48.65	86.01	46.45	81.51	43.39	76.72	38.65	71.96
N =	1229	1229	1115	1115	921	921	344	344	138	138

According to Table VI, 1115 cases retain a mean score of 48.65 points² or 86.01 per cent. of the history after an interval of four months. This is really a considerable amount to be remembered after so long a time. Yet several things must be taken into consideration to explain adequately the large amount of history retention. First, among these, the means are based on history scores made at the end of the semester. Second, there are many chances for incidental learning in history. And, third, the content of history is rich in associations; the epochs or factors stand out in the child's mind as typical; the principles of contrast as well as similarity are appealed to; and then, past events are made the means of understanding the present. By taking all of these desiderata into account, the large amount of history retained after a lapse of four months, is what instructors might, at least, hope for in a typical school situation.

After an interval of eight months, 921 cases have a mean amount retained of 46.45 points or 81.51 per cent. Here is a bit of evidence which needs emphasis, for 81.51 per cent. is very much closer to 86.01 per cent. than 86.01 per cent. is to 100.00 per cent. The real significance of these differences will again be mentioned under "forgetting." The mean amount retained after a lapse of a year is 43.39 points or 76.72 per cent. After a year and four months, only 138 cases were secured for the retest. These pupils have a mean score of 38.65 points or 71.96 per cent.

In conclusion, the mean amount of history retained after 16 months is very high, indeed. This should be especially significant, since the teachers of history need to put forth every effort to give the pupils as large an initial fund of history knowledge as possible when they realize that a large amount of the history which the children know at the end of a semester is still retained after long intervals.

B. MEANS AND PER CENTS. OF THE HISTORY FORGOTTEN

Table VII gives the means of the raw scores and the percentages of the amount forgotten for all the pupils after lapses

² Points = raw score.

of four, eight, twelve, and sixteen months. This table answers the question: How much of the history knowledge is forgotten in classroom situations?

TABLE VII

AMOUNT AND PER CENT. OF HISTORY FORGOTTEN BY ALL THE CASES ON THE TESTS AFTER INTERVALS OF FOUR, EIGHT, TWELVE AND SIXTEEN MONTHS

	4 Mo.		8 Mo.		12 Mo.		16 Mo.	
	Amt.	%	Amt.	%	Amt.	%	Amt.	%
Mean	7.94	13.99	10.53	18.49	13.14	23.28	15.21	28.04
N. =	1115	1115	921	921	344	344	138	138

For 1115 cases, after a lapse of four months, there is a mean loss of 7.94 points or 13.99 per cent.; after eight months for 921 cases, there is a mean loss of 10.53 points or 18.49 per cent.; after 12 months the mean loss for 344 cases is 13.14 points or 23.28 per cent.; then, after an interval of 16 months the mean loss is 15.21 points or 28.04 per cent.

In summary, the small amount of forgetting of the classroom history is of vital consequence. While seeking an explanation, we should keep in mind that these records are based on the initial test given at the end of the semester. In some instances, weeks and months elapsed since the children were taught the material. In this connection, let us note that Jones (1923) says, "From what we know of the curve of forgetting for just learned material, it is probable that the content of a lecture is forgotten more rapidly during the lecture itself than at any time afterward."³ In the case of the initial examination, at the end of the semester, much forgetting has already taken place, yet the evidence in this investigation is based on the scores made by children after studying the history of a given grade. In the light of the evidence of this study, about 28 per cent. of the history is forgotten after a year and four months. When compared with the conclusions of many experiments, this is, indeed, a small amount of forgetting, yet the history relations—associations—should guarantee little loss if the teaching is prop-

³ Jones, H. E.: *Experimental Studies of College Teaching. The Effect of Examination on Permanence of Learning.* Archives of Psychology, No. 68, pp. 1-70, 1923.

erly done. At this point, Thorndike's notable expression is helpful: "On the whole, then, the scanty and apparently inconsistent facts about the rate of forgetting and changes in it perhaps agree in revealing that the amount of forgetting, and the form of the curve of forgetting, in each case, are consequences of the nature of the bonds, the degree of over-learning of each, and of each of the elements of each, their relations, and the competing bonds which whatever activities fill the interval establish."⁴

C. CURVES OF FORGETTING

Closely allied to the amount forgotten are the curves of forgetting which are given in Figure I. These curves are based on the cases which took the tests throughout a certain time interval. The exact amounts retained by these cases are shown in Table VIII.

TABLE VIII
AMOUNTS OF HISTORY RETAINED BY ALL THE CASES ON THE INITIAL
TEST AND AFTER INTERVALS OF FOUR, EIGHT, TWELVE,
AND SIXTEEN MONTHS

Cases	0 Mo.		4 Mo.		8 Mo.		12 Mo.		16 Mo.	
	Amt.	%	Amt.	%	Amt.	%	Amt.	%	Amt.	%
1115	56.61	100	48.64	85.94	45.96	80.97				
807	56.76	100	49.15	86.57	49.88	85.38				
114	58.47	100			45.99	81.36	43.39	76.76		
344	56.53	100	48.98	86.64	43.39	80.56	40.25	74.74	38.64	71.74
138	53.86	100	45.96	85.33						

If this Table tells us anything worthy of note, it is the closeness of the scores for the different cases on the initial test, since they are all in the fifties; after an interval of four months they are still above forty; and after 12 and 16 months the scores drop slightly, until 138 cases make a mean score of 38.64 points after a year and four months.

By examining Figure I we see that the curves fall more during the first four months than during any of the later intervals. Hence, the conclusion is that the curves of forgetting for history descend abruptly and then gradually diminish their slope.

⁴Thorndike, Edward L.: Educational Psychology. Briefer Course. Teachers College, Columbia University, 1923, p. 258.

To educational procedure, these curves of forgetting have significant implications, since they show that the children forget most, early after studying a school subject. Reviews and examinations should be given soon after learning ceases, since the material is then fresh in the child's mind. These curves of forgetting for a school study are of the same general

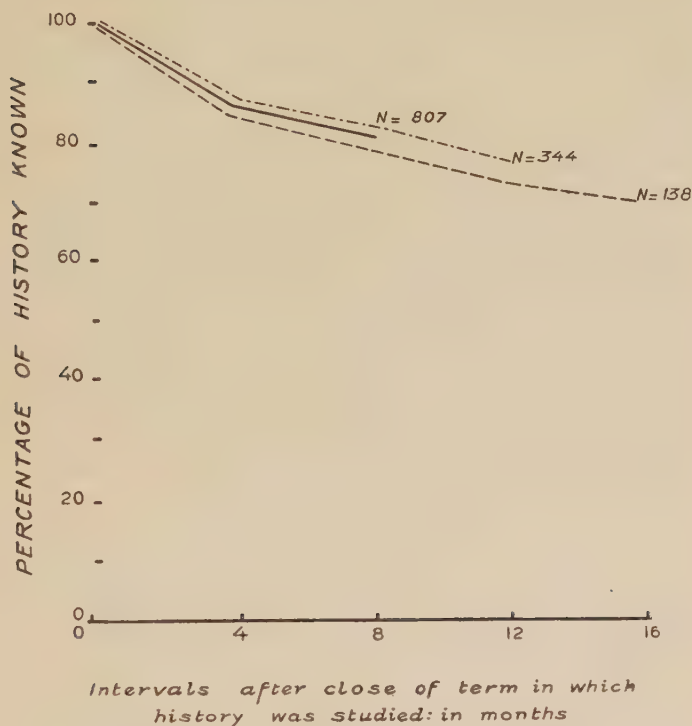


FIGURE 1.—Curves of Forgetting.

form as the classic curves of Ebbinghaus and Radossawlewitsch, but here the effect of disuse is much less.

D. AMOUNT AND PER CENT. OF HISTORY RETAINED BY GRADES

Frequently the question is asked: In what grades do the children remember the most history? Table IX gives the tabulated records for history retention in the sixth, seventh, and eighth grades.

TABLE IX

AMOUNT AND PER CENT. OF HISTORY RETAINED BY THE GRADES										
	0 Mo.		4 Mo.		8 Mo.		12 Mo.		16 Mo.	
	Amt.		Amt.	%	Amt.	%	Amt.	%	Amt.	%
GRADE VI										
Mean	53.19		45.75	86.07	43.19	81.26	40.56	76.54	38.31	74.50
N =	310		282	282	310	310	160	160	74	74
GRADE VII										
Mean	56.72		49.27	87.54	48.52	82.39	45.85	76.88	39.03	69.01
N =	686		600	600	519	519	184	184	64	64
GRADE VIII										
Mean	61.72		50.54	81.99	45.68	77.35				
N =	233		233	233	92	92				

After the four-month interval 282 sixth grade pupils make a mean of 45.75 points⁵ or 86.07 per cent.; on the eight-month retest 310 sixth grade children make a mean of 43.19 points or 81.26 per cent.; on the 12-month interval 160 sixth grade pupils make a score of 40.56 points or 76.54 per cent.; and after a lapse of 16 months 74 sixth grade children make a mean of 38.31 points or 74.50 per cent. After a year and four months sixth grade pupils retain about 75 per cent. of what they made on an examination at the end of the school term.

Table IX shows that 600 seventh grade children make a mean of 49.27 points or 87.54 per cent. after an interval of four months; on the eight month's interval 519 seventh grade pupils make a mean of 48.52 points or 82.39 per cent.; on the year's interval 184 seventh grade pupils make a mean of 45.85 points or 76.88 per cent.; and after an interval of 16 months 64 seventh grade children make a mean of 39.03 points or 69.01 per cent. However, a glance at Table V shows that the different groups within the seventh grade vary considerably. For instance, 120 VII A's make a mean of 54.37 points on the four-month test, while 167 VII B's make a mean of 43.70 points for the same interval.

It is to be regretted that the experimenter was unable to secure the records for longer intervals for the eighth grade

⁵ Points = raw scores.

pupils; but it was impossible to do so because the pupils go to many schools at the end of the eighth and ninth grades. The 233 pupils in grade VIII, after an interval of four months, made a mean of 50.54 points or 81.99 per cent.; after an interval of eight months 92 eighth grade pupils made a mean score of 45.68 points or 77.35 per cent. A moment's attention to Table V shows that 44 VIII B's on the four month's interval made a mean of 47.32 points while 62 VIII B's make a mean of 53.02 points.

By comparing the means for the sixth, seventh and eighth grades three interesting facts appear. First, there are variations among the different groups within a given grade. Second, the differences among the groups within a grade are greater than the differences between the grades. Third, all the grades retain history well.

CHAPTER 3

CORRELATIONS BETWEEN THE VARIOUS RETENTION TESTS AND BETWEEN THE TESTS AND THE LOSSES (FORGETTING)

What is the relative standing of pupils on the different retention tests? Does time influence the relative standing of grammar school or junior high school pupils? What is the relationship of history retention to forgetting? To answer these questions, the Pearson coefficients of correlations¹ were found between the initial test (T_0) and its repetitions after intervals of four (T_4), eight (T_8), twelve (T_{12}), and sixteen months (T_{16}). Then the coefficients of correlations were calculated to find the relations between T_4 and T_8 , between T_8 and T_{12} , and between T_{12} and T_{16} . To find the existing relationships between retention and forgetting, the Pearson r 's were computed between the initial retention test and the loss after four (L_4), eight (L_8), twelve (L_{12}), and sixteen months (L_{16}). These coefficients are presented in Table X.

According to Table X, the mean coefficient of correlation between T_0 and T_4 for 1115 cases is .838, between T_0 and T_8 for 921 cases is .797, between T_0 and T_{12} for 344 cases is .839, and between T_0 and T_{16} for 138 cases is .840. Therefore, considerably high and positive relationships exist between the different retention tests. Inasmuch as these coefficients are very much alike, time is not a factor which causes any appreciable variation in the relative standing of children within given groups. It is in keeping with Woodyard's remarks: "From these 500 ninth-year students, the amount of variations within the two hours' time required for the test to be written is evidently very nearly the same as occurs after an interval of a year's time. Whatever are the causes that make individuals vary in their mental work upon such tests, they are operative largely if not wholly in independence of the time factor."²

¹ See Garrett, *Statistics in Psychology and Education*, p. 167.

² Woodyard, E.: *The Effect of Time Upon Variability*. Teachers College, Columbia University Contribution to Education, No. 216, 1926.

TABLE X
CORRELATION BETWEEN THE VARIOUS RETENTION HISTORY TESTS AND BETWEEN THE VARIOUS RETENTION HISTORY TESTS
AND THE LOSSES (FORGETTING)

Grade	No. of cases	$r_{T_0T_4}$	$r_{T_0T_8}$	$r_{T_0T_{12}}$	$r_{T_0T_{16}}$	$r_{T_4T_8}$	$r_{T_8T_{12}}$	$r_{T_{12}T_{16}}$	$r_{T_0L_4}$	$r_{T_0L_8}$	$r_{T_0L_{12}}$	$r_{T_0L_{16}}$
VI B	30	.963	.859	.919	.886	.868	.861	.978	.544	.555	.399	.388
VI B	28		.575							.537		
VI A	122	.837	.815			.926			.112	.058		
VI A*	86*	.843	.838	.843		.959	.943		.001	.015	-.141	
VI A*	44*	.859	.882	.808	.827	.978	.911	.963	.083	-.102	-.146	.098
VII B	167	.887							.520			
VII B†	107†	.875	.843			.914			.523	.526		
VII B†	64†	.891	.869	.811	.807	.953	.898	.943	.529	.486	.589	.604
VII A	142	.859	.787			.909			.156	.291		
VII A†	120†	.878	.826	.812		.934	.960		.086	.241	.022	
VII A	86		.834							.389		
VIII B	79	.804							.200			
VIII B§	62§	.756							.052			
VIII B§	44§	.775	.768			.974			.223	.185		
VIII B§	27§	.729	.727			.968			.023	.018		
VIII A	21	.775	.740			.899			.249	.352		
Mean of Correlations		.838	.797	.839	.840	.935	.915	.961	.238	.273	.145	.298
Total No. of Cases	1220	1115	921	344	138	807	344	138	1115	921	344	138

T_0 = Test 0 Months lapse.
 T_4 = Test 4 Months lapse.
 T_8 = Test 8 Months lapse.
 T_{12} = Test 12 Months lapse.
 T_{16} = Test 16 Months lapse.

L_4 = Losses after 4 Months.
 L_8 = Losses after 8 Months.
 L_{12} = Losses after 12 Months.
 L_{16} = Losses after 16 Months.

* Included in the group of 122 VI A pupils.
† Included in the group of 167 VII B pupils.
‡ Included in the group of 142 VII A pupils.
§ Included in the group of 79 VIII B pupils.

Table X shows a mean coefficient of correlation between T_4 and T_8 of .935 for 807 cases, between T_8 and T_{12} of .915 for 344 cases, and between T_{12} and T_{16} of .961 for 138 cases. Here, indeed, the relationships are exceedingly close. They illustrate Thorndike's sentence, "The relation between retention of the effects of an experience for one or two minutes and their retention for one or two days seems to be one of the closest yet measured in human nature."³

The Pearson r 's between the retention and forgetting are given in Table X. The mean of the correlations between T_0 and L_4 is .238 for 1115 cases, between T_0 and L_8 is .273 for 921 cases, between T_0 and L_{12} is .145 for 344 cases, and between T_0 and L_{16} is .298 for 138 cases. Therefore, the relationships between retention and forgetting are low but positive. However, there are wide variations between the correlations among the different groups shown in Table X. For example, the Pearson r between T_0 and L_{12} for 44 VI A's is -.146, while it is .589 between T_0 and L_{12} for 64 VII B's.

In summary, the relationships between the various retention tests and between these tests and forgetting are of vital consequence. First, the data of this study show that time and the forgetting that accompanies it do not greatly reduce the relative standing of the pupils on these history tests; that is, the pupils who make the highest scores on the initial tests tend to keep the same high standing in their group after long time intervals, even up to 16 months. Second, time is not a factor which contributes to the variability of the standing of pupils in examinations after delayed intervals. To education this is of importance, since the children, who get the most out of a history course, will know the most after a year or more, provided there is no extra individual learning. Third, there is little relationship between retention and forgetting. In general, the pupils who know the most tend slightly to forget more, although they can afford to forget the most and still rank high in the group.

³ Thorndike, E. L.: The Relation between Memory for Words and Memory for Numbers and the Relation between Memory over Short and Memory over Long Intervals. *American Journal of Psychology*, Vol. 21, pp. 487-8, 1901.

CHAPTER 4

DETAILED ANALYSIS OF THE RETENTION AND FORGETTING OF VII B HISTORY QUESTIONS

What kinds of history knowledge are retained? What kinds are forgotten? What are the sex differences in retaining and forgetting history questions? In order to secure these answers, 64 VII B examinations were analyzed for the initial test, as well as, for the tests after intervals of four (T_4), eight (T_8), twelve (T_{12}), and sixteen months (T_{16}). On the true-false test, there are 40 questions, on the completion 10 questions, and on the multiple-choice there are 20 questions. The records are for 64 individual cases—27 girls and 37 boys.

The kinds of history knowledge which can be retained are shown in Table XI. Question 4 of the true-false examination has to do with homes and is well remembered by the children, for on T_0 three pupils fail to answer it correctly, while on T_{16} six children do not know the answer. Another well-remembered question is number 10 on the true-false test. This question is, likewise, one that deals with a concrete situation—mail service. On T_0 three children miss the question and on T_{16} 14 have forgotten it. Other well-retained questions are: Numbers 14, writs of assistance, search warrants; 24, Continental Congress; 25, George Washington, Commander-in-Chief of the American Army; 30, Treaty of Paris in 1783; and 37, number of Senators from each state. On the completion test, the children remember best questions 2, colonial homes; 5, Franklin seeks aid in France; 11, significance of aiding France in time of war. On the multiple-choice examination the questions which the children retain best are: Numbers 7, home manufacturing; 9, Maryland signers of the Declaration of Independence; 20, location of our national Capital; and 21, Washington's Foreign Policy. Thus, pupils retain knowledge of home conditions, mail, etc. Such historical information is concrete and personal. No doubt, pictures had been used in the presentation of these

history facts in order to bring out the contrast and similarity of the past with the present conditions. Then, the epochs and events which had been given great prominence in the history lessons are well remembered; for example, Washington taking command of the American forces at Cambridge, Franklin at the Court of Louis XVI, or the dramatic episodes of the Second Continental Congress. How often do wide-awake teachers dramatize these historical events and thus make a lasting impression on the child's mind?

TABLE XI
DETAILED ANALYSIS OF THE HISTORY QUESTIONS

GRADE VII B

Part I.—True-False

Directions: Some of the statements below are true and some are false. Put + on the line at the left of a statement if the statement is true. Put — on the line at the left of a statement if it is not true. Go through the list of statements quickly, answering those of which you are sure, then go back and study the more difficult statements. Answer these if you think that you know them.

		Failed to answer correctly				
		T ₀	T ₄	T ₈	T ₁₂	T ₁₆
<u>+</u>	1. The majority of the people of the Thirteen Colonies were English.	..	..	..	..	..
—	2. The Scotch-Irish settlers were the great Indian fighters and marksmen of America.	25	36	27	33	32
—	3. The American colonists quickly got rid of all their old-world customs.	18	20	19	26	21
—	4. Down to the end of the colonial period many of the houses were made of roughly dressed logs.	3	9	8	10	6
—	5. The colonists imported all of their clothes from England.	17	21	27	27	34
—	6. In the southern colonies, sleighing and skating were the favorite pastimes.	3	8	19	16	22
—	7. In New England the schoolhouse came next after the church and blockhouse.	13	19	18	14	14
—	8. Among the early colonies Maryland and Rhode Island set the example of religious toleration.	15	15	21	26	32
—	9. No manufacturing was carried on in the colonies.	15	21	19	19	26
—	10. The mail of the early colonists was carried by postmen, on horseback or stage-coach.	3	8	3	9	14
—	11. The representative type of government in the New England Colonies was similar to the Virginia House of Burgesses in every way.	30	29	37	37	42

	Failed to answer correctly				
	T ₀	T ₄	T ₈	T ₁₂	T ₁₆
—12. The colonists had little chance to practice self-government because of the power of the royal governors in all of the colonies.	27	43	43	45	48
—13. The Navigation Acts forced the colonists to bring all goods to America in their own or English vessels.	12	11	19	24	15
—14. The Writs of Assistance were very much like our search warrants.	7	11	11	16	11
—15. The Stamp Act was an old law made years before, which George III decided to enforce upon the Americans.	25	38	53	57	52
—16. The Stamp agents were made to shout, "Liberty, property, and no stamps."	18	10	16	22	24
—17. Pitt was a great favorite with the colonists.	19	16	18	25	25
—18. The Americans could get tea from England cheaper than they could smuggle it from Holland.	36	41	44	45	45
—19. The great orators of the colonists were Jefferson, Washington and Paul Revere.	22	30	31	39	35
—20. General Gage was sent to Boston with four regiments.	12	20	14	24	25
—21. The first Continental Congress met in Boston.	15	20	34	36	42
—22. The Battle of Lexington was fought on April 19, 1775.	12	12	17	20	25
—23. Bunker Hill was defended by Putnam, Stark, Greene, and Warren.	30	25	35	27	30
—24. The Second Continental Congress met in Philadelphia.	4	3	9	12	13
—25. George Washington was made commander-in-chief of the American Army.	0	2	4	4	3
—26. A pamphlet called "Common Sense" was written by Adams.	25	30	40	45	45
—27. Benjamin Franklin was the author of the Declaration of Independence.	12	11	19	19	19
—28. Burgoyne surrendered to General Gage at Saratoga.	32	43	40	50	52
—29. John Eager Howard was a Maryland hero of the Revolution.	18	22	17	33	25
—30. At the close of the Revolutionary War, the Treaty of Peace was signed at Paris, 1783.	8	6	8	12	11
—31. The Gulf of Mexico was agreed upon as our southern boundary in the Treaty of 1783.	19	43	39	52	51
—32. The Continental Congress governed simply by common consent.	19	24	22	25	32
—33. The Articles of Confederation gave Congress the power to compel the states to supply the needed troops.	26	29	33	34	37

		Failed to answer correctly				
		T ₀	T ₄	T ₈	T ₁₂	T ₁₆
—34.	The making of the Ordinance of 1787 was one of the wisest acts of the Congress of the Confederation.	12	20	25	22	26
—35.	Washington was the president of the Constitutional Convention.	19	23	24	37	37
—36.	Thomas Jefferson was the author of the Constitution.	24	43	45	49	53
—37.	The Constitution says that each State shall have the same number of Senators.	8	8	16	17	15
—38.	The people liked the Constitution because it had a Bill of Rights when adopted in 1788.	38	39	48	49	52
—39.	Washington urged us to help the foreign nations since Lafayette had helped us during the Revolution.	20	32	27	31	30
—40.	Mr. X., Mr. Y., and Mr. Z. were Americans sent to win the friendship of France.	21	36	34	37	40
—41.	The Alien and Sedition Acts hastened the downfall of the Federalist Party.	26	36	37	40	49

Go over your list of statements again carefully.

Write the number of minutes required to do this part. _____ minutes.

Begin to answer Part II at once.

Part II.—Completion

Directions: Some important words have been omitted from the following statements. Write in the blank the word that best completes the meaning of the sentence. Each blank represents one word.

		Failed to answer correctly				
		T ₀	T ₄	T ₈	T ₁₂	T ₁₆
1.	<i>Cornwallis</i> surrendered at Yorktown.	..	..	..	..	..
2.	One important part of every colonial home was the great _____, the only means of heating.	5	4	1	1	3
3.	George III turned the people of England against him by trying to bribe the members of _____.	30	37	34	35	31
4.	The "Circular Letter" was penned by _____.	29	43	43	47	41
5.	Franklin tried to help us by asking aid from the King of _____.	6	17	17	16	17
6.	The "_____ of _____" states "that all men are created equal."	33	40	37	31	36
7.	_____ went from door to door in Philadelphia trying to get money to carry on the Revolutionary War.	26	45	45	48	49

	Failed to answer correctly				
	T ₀	T ₄	T ₈	T ₁₂	T ₁₆
8. _____ won the Mississippi as our western boundary.	21	29	39	37	37
9. Washington was inaugurated in the city of _____.	42	55	48	49	46
10. The First Secretary of the Treasury was _____.	28	45	43	46	46
11. Washington knew that aiding France meant war with _____.	4	6	4	10	10

Go over Part II again and try to answer any statements you have omitted.

Record time here. _____ minutes.

Go on with Part III.

Part III.—Multiple-Choice

Directions: In each sentence select the one word or phrase which you think makes the statement true. Underline this answer.

	Failed to answer correctly				
	T ₀	T ₄	T ₈	T ₁₂	T ₁₆
1. George Washington was born in the state of (a) New York; (b) Maryland; (c) <i>Virginia</i> ; (d) Massachusetts.	..	..	..	..	..
2. The early English colonists settled along the (a) James River; (b) Colorado River; (c) Mississippi River; (d) Columbia River.	19	15	16	11	13
3. In the early colonial days the most common mode of travel was by (a) horse; (b) foot; (c) stagecoach; (d) boat and river.	30	34	34	36	38
4. We inherited from England the following right of all Englishmen (a) freedom of speech and press; (b) right to organize minutemen; (c) trial by admiralty courts; (d) representation without taxation.	17	22	32	25	23
5. The Stamp Act Congress was held in (a) Boston; (b) New York; (c) Philadelphia; (d) Baltimore.	40	56	55	54	57
6. The Port Bill closed the port of (a) Charleston; (b) Boston; (c) Richmond; (d) Philadelphia.	13	9	14	21	20
7. Home manufacturing was helped by the (a) Daughters of Liberty; (b) smuggling; (c) Hat Act; (d) Intolerance Act.	7	7	7	7	10
8. "I rejoice that America has resisted" was said by (a) Washington; (b) Franklin; (c) Pulaski; (d) Pitt.	27	30	26	24	27
9. One of the Maryland signers of the Declaration of Independence was (a) Lee; (b) McHenry; (c) Charles Carroll of Carrollton; (d) Sherman.	12	14	12	13	12
10. The French King promised to send us supplies after the battle of (a) Trenton; (b) Saratoga; (c) Long Island; (d) Camden.	14	20	24	30	27

30 RETENTION AND FORGETTING OF HISTORY QUESTIONS

	Failed to answer correctly				
	T ₀	T ₄	T ₈	T ₁₂	T ₁₆
11. Our soldiers were drilled at Valley Forge by (a) Greene; (b) Warren; (c) Hessians; (d) Steuben.	20	25	27	25	24
12. The last of the States to agree to the Articles of Confederation was (a) Maryland; (b) Rhode Island; (c) Georgia; (d) Delaware.	28	36	36	35	35
13. The Constitutional Convention met in (a) 1492; (b) 1620; (c) 1776; (d) 1787.	15	42	38	40	42
14. A stronger government was urged by (a) Patrick Henry; (b) Benedict Arnold; (c) George Washington; (d) Daniel Morgan.	19	32	33	40	38
15. The Ordinance of 1787 applied to (a) Maryland; (b) United States; (c) North Carolina; (d) Northwest Territory.	21	22	24	17	16
16. "The Father of the Constitution" was (a) Madison; (b) Sherman; (c) Hancock; (d) Adams.	18	23	28	31	36
17. The "Ship of State" is (a) Old Ironsides; (b) Constitution of the United States; (c) Bill of Rights; (d) State of Pennsylvania.	30	32	34	27	31
18. Our commerce is controlled by (a) Congress; (b) Secretary of the Navy; (c) the President; (d) Supreme Court.	16	13	14	23	18
19. "We, the people of the United States" are the opening words of (a) Patrick Henry's speech; (b) Circular Letter; (c) Constitution; (d) Washington's Farewell Speech.	28	45	45	35	35
20. It was thought wise to select the following place for our national capital (a) Mount Vernon; (b) Cambridge; (c) Annapolis; (d) Washington.	12	18	19	20	17
21. Washington's Foreign Policy was (a) to stay out of European struggles; (b) to send the fighting nations money; (c) to enter into their wars; (d) to help them make their peace treaties.	12	18	14	14	13

Go over Part III again.

Record time here. _____ minutes.

Go on with Part IV.

What kinds of history knowledge do children forget? On the true-false test, the questions which are forgotten most often are: Numbers 11, comparison of the types of colonial government; 12, chances for self-government in colonial days; 15, Stamp Act; 18, England's tea policy; 21, place where the First Continental Congress met; 23, names of the defenders of Bunker Hill; 26, name of the author of "Com-

mon Sense"; 28, name of the general to whom Burgoyne surrendered; 33, powers of the Continental Congress under the Articles of Confederation; 38, Bill of Rights to the Constitution; and 41, Alien and Sedition Acts. In the case of the completion test, the forgotten questions are: Numbers 3, English Parliament; 4, name of the author of the "Circular Letter"; 6, words in the Declaration of Independence; 7, Morris's financial endeavors; 8, Clark's success in the Mississippi region; 9, name of the city where George Washington was first inaugurated; and 10, name of the first Secretary of the Treasury. Three questions stand out as being very poorly remembered on the multiple-choice test. They are: Numbers 5, place where Stamp Act Congress met; 13, date of the Constitutional Convention; and 19, opening words of the "Constitution." Evidently, children forget history knowledge that involves the names of persons and places. It seems that they confuse the names of prominent men, and with the increase in time interval, such heroes as Washington have to carry a tremendous part of the burden of history. These seventh grade children appear to be unable to comprehend thoroughly or to retain the abstract knowledge and technical phraseology called for in legal documents and government. This use of the term "government" is widely separated from the concrete affairs of everyday civic life.

What are the sex differences in the retention and forgetting of different kinds of historical knowledge? In general, the questions which are retained or forgotten by the boys are, likewise, in the same category for the girls. However, there are exceptions to this generalization. The total failure to answer the history questions for the separate group of 37 boys and 27 girls are given in Table XII. For example, question 28 on the true-false test failed to be answered by the boys on T_0 16 times, T_4 21 times, T_8 19 times, T_{12} 26 times, and T_{16} 28 times. Yet for the same time interval 27 girls failed to answer it 16, 22, 21, 24, and 24 times, respectively. This question necessitates knowing to whom Burgoyne surrendered. It is natural that the boys, who are

TABLE XII
ANALYSIS OF THE HISTORY QUESTIONS TO SHOW SEX DIFFERENCES: FAILURE TO ANSWER CORRECTLY
GRADE VII B
N = 37 BOYS
N = 27 GIRLS

Boys						Boys						Girls						Girls					
Time interval	Boys					True-False 2*	Boys					True-False 2*	Girls					True-False 37* 38 39 40 41	Girls				
	0 Mo.	4 Mo.	8 Mo.	12 Mo.	16 Mo.		0 Mo.	4 Mo.	8 Mo.	12 Mo.	16 Mo.		0 Mo.	4 Mo.	8 Mo.	12 Mo.	16 Mo.		0 Mo.	4 Mo.	8 Mo.	12 Mo.	16 Mo.
True-False	13	9	16	8	12	10	5	7	11	13	10	12	20	19	21	22	3	1	5	4	5		
2*	9	6	9	6	15	10	20	23	30	28	30	2	9	14	10	11	37*	18	18	21	22		
3	4	1	6	3	18	4	10	18	15	17	15	3	9	14	10	11	38	16	14	14	15		
4	5	9	12	11	13	11	18	17	24	24	5	8	9	16	16	16	39	10	16	17	16		
5	2	3	8	13	14	14	20	18	21	24	6	1	5	11	9	41	12	16	19	25			
6	5	2	3	8	13	14	20	18	21	24	6	1	5	11	9	41	12	16	19	25			
7	7	13	11	6	7	4	3	1	0	2	7	6	7	8	7	2	1	0	1	1			
8	10	7	11	13	17	18	18	18	18	15	8	5	8	10	13	15	4	9	16	17			
9	7	9	9	10	13	20	27	25	26	21	9	8	12	10	13	15	4	9	16	18			
10	1	3	3	5	6	2	7	7	5	9	10	2	5	0	4	5	4	10	10	8			
11	13	15	19	19	21	22	21	24	20	23	11	17	14	18	21	6	11	19	13	13			
12	16	25	22	23	26	7	18	26	28	27	12	11	18	21	22	7	8	19	17	22			
13	7	5	11	11	5	12	15	21	19	19	13	5	6	8	13	10	9	14	18	18			
14	4	5	7	8	1	25	29	27	25	25	14	3	6	4	10	9	17	26	22	24			
15	14	26	36	31	31	18	23	22	25	24	15	11	12	21	21	10	22	21	21	22			
16	10	7	9	15	15	11	18	23	22	24	16	8	3	7	9	11	4	3	7	6			
17	12	8	10	12	16	8	7	7	4	4	17	7	8	13	9	2	11	8	7	9			
18	19	21	24	25	25	2	22	19	20	21	18	17	20	20	20	3	10	12	15	16			
19	12	17	17	19	20	4	10	11	15	12	19	10	13	14	15	4	7	11	17	17			
20	8	10	6	15	12	6	4	30	27	31	20	4	10	8	9	5	16	25	27	26			
21	11	12	18	21	24	6	4	7	10	6	21	4	8	16	15	18	6	7	11	14			
22	4	4	8	12	16	7	3	5	4	6	22	8	8	9	8	9	2	3	3	4			
23	15	15	16	14	14	16	16	15	15	16	23	15	10	19	13	16	11	15	10	11			
24	3	3	6	11	9	9	11	7	7	7	24	1	0	3	1	9	3	5	6	5			
25	10	0	1	3	1	8	12	15	16	16	25	0	2	3	2	10	6	9	14	11			
26	15	19	24	27	12	10	12	14	12	10	26	10	11	16	18	17	11	10	13	14			
27	7	5	11	11	12	18	21	21	21	18	27	5	6	8	24	12	15	15	14	17			
28	16	21	19	26	28	13	10	25	19	22	28	16	22	21	24	13	5	17	19	17			
29	10	11	9	20	13	11	17	17	17	18	29	8	11	8	12	8	15	16	18	20			
30	6	5	4	9	8	15	13	15	13	9	30	2	1	4	3	15	7	8	14	12			
31	12	24	25	32	28	17	14	20	17	14	31	7	19	10	23	16	5	9	14	13			
32	11	14	12	15	21	17	15	15	12	14	32	8	10	10	11	17	13	10	17	17			
33	14	14	17	18	21	17	15	15	12	14	33	12	15	16	16	18	8	10	13	16			
34	6	11	12	14	17	18	3	7	10	9	34	6	9	13	8	9	11	20	15	10			
35	11	9	18	22	21	17	24	25	7	8	35	8	14	15	16	20	7	13	12	10			
36	18	24	25	28	29	5	5	7	6	4	35	6	19	20	21	21	11	18	10	9			

* Number of the Questions. See Table XI for the Questions.

more interested in fighting should remember the correct answer better than the girls. Still another outstanding difference in the ability to answer questions is the twentieth on the multiple-choice test. At the stated time intervals, the 37 boys fail to answer the question as to the location of National Capital 5, 5, 7, 8 and 7 times, respectively. The 27 girls miss it 7, 13, 12, 12 and 10 times, respectively. This difference in the retentiveness of the name Washington, D. C., may be due to the interest which boys take in things and places. Then, again, the boys may have had more personal experiences in the city—Washington.

In conclusion, history knowledge which is concrete and personal tends to be well remembered. Then, the heroes and historic episodes which have received considerable emphasis in teaching are retained after long intervals. For educational procedure, this is worthy of consideration, since history instruction needs to stress the high points through enrichment of subject matter, use of pictures and posters, characterizations and dramatizations, and pupil participation wherever possible in the reliving of actual historical situations. The history knowledge is most easily forgotten by seventh grade children if it leads to a confusion of the names of persons and places, as well as to an inability to grasp and retain abstractions and technicalities of legal documents and governmental procedure. In general, boys and girls do not differ in this respect. Nevertheless, the boys show greater retentiveness for knowledge relative to fighting or to some geographical place. Lastly, much more needs to be done with an analysis of the history questions which are retained and forgotten in actual school situations.

CHAPTER 5

SEX DIFFERENCES IN HISTORY RETENTION

What is the difference of sex on the retention of history? To secure the data for answering this question three groups of boys and girls were equated on the bases of (1) initial history test scores, (2) interest and effort, and (3) ability to pass the standard history test, the Understanding of American History by Pressey and Richards. These groups were equated on interest and effort and ability to pass the standard history test, because in the light of the evidence of this study, these are the two factors which give the highest prediction for history retention. Table XIII shows the means and Q's for

TABLE XIII
INFLUENCE OF SEX ON RETENTION OF HISTORY
GROUPS OF BOYS AND GIRLS EQUATED ON THE BASES OF THE INITIAL
RETENTION TEST (T_0), INTEREST AND EFFORT (IE), AND ABILITY
TO PASS PRESSEY-RICHARDS STANDARD HISTORY TEST (HIS)

VII A				VII A			
44 Boys				44 Girls			
	T_0^*	IE	HIS		T_0	IE	HIS
Mean	60.93	74.70	24.36	Mean	60.45	75.27	23.63
Q	8.08	10.17	5.50	Q	8.00	9.03	4.59
VII B				VII B			
23 Boys				23 Girls			
	T_0	IE	HIS		T_0	IE	HIS
Mean	56.39	69.96	26.57	Mean	56.48	70.35	24.65
Q	12.25	14.75	5.80	Q	11.94	14.90	5.05
VI A				VI A			
28 Boys				28 Girls			
	T_0	IE	HIS		T_0	IE	HIS
Mean	53.61	74.54	26.75	Mean	53.55	75.04	26.18
Q	5.88	7.50	4.38	Q	3.67	7.62	4.00

* T_0 = Initial test.

the three equated groups of 44 VII A boys and girls, 23 VII B boys and girls, and 28 VI A boys and girls.

Table XIV gives the differences in history retention for the three groups of 190 pupils. On the four-, eight-, and twelve-month intervals, the 44 VII A boys excel the mean

TABLE XIV

INFLUENCE OF SEX ON RETENTION OF HISTORY SHOWN IN MEANS FOR GROUPS OF BOYS AND GIRLS

Retention Test		T ₀ *	T ₄	T ₈	T ₁₂	
VII A	44 Boys	60.93	54.95	50.98	48.68	
VII A	44 Girls	60.45	53.34	48.68	47.36	
Less for Girls		— 0.48	— 1.61	— 2.30	— 1.32	
Q Difference					1.392	
Retention Test		T ₀	T ₄	T ₈	T ₁₂	T ₁₆
VII B	23 Boys	56.39	46.91	44.70	39.44	37.22
VII B	23 Girls	56.48	45.61	42.04	38.26	36.17
Less for Girls		+ 0.09	— 1.30	— 2.66	— 1.18	— 1.05
Q Difference					2.386	
Retention Test		T ₀	T ₄	T ₈	T ₁₂	
VI A	28 Boys	53.61	46.21	43.68	42.18	
VI A	28 Girls	53.55	44.93	42.39	39.07	
Less for Girls		— 0.06	— 1.28	— 1.29	— 3.11	
Q Difference					1.746	

* T₀ = Initial test.T₄ = Test after interval of four months.T₈ = Test after interval of eight months.T₁₂ = Test after interval of twelve months.T₁₆ = Test after interval of sixteen months.

history scores of the 44 VII A girls by 1.61, 2.30, and 1.32 points, respectively. For the same time intervals, as well as the 16-month lapse, 23 VII B boys excel the 23 VII B girls by 1.30, 2.66, 1.18, and 1.05 points. The group of 28 VI A boys, likewise, slightly excel the 28 VI A girls by 1.28, 1.29, and 3.11 points for the four-, eight-, and twelve-month intervals, respectively.

Still another interesting element in the sex differences of history retentiveness is revealed by the Q of the differences for the group of 44 VII A boys and girls for the 12-month interval where it is 1.39; for the 23 VII B boys and girls it is 2.39; and for the 28 VI A boys and girls it is 1.75.

In conclusion, the boys are slightly superior to the girls in history retention. As they stand, the boys maintain this superiority for all the time intervals.

CHAPTER 6

OTHER FACTORS RELATED TO RETENTION OF HISTORY

A. SINGLE FACTORS

What is the extent of the relationship between history retention and the factors that may influence retention, namely, (1) mental age, (2) chronological age, (3) subject preference, (4) interest and effort, (5) reading comprehension, (6) ability on a standard test, The Understanding of American History by Pressey-Richards, (7) height, and (8) weight?

An exact method of ascertaining this relationship is to find the correlations between the retention—on the initial test (T_0), and after intervals of four (T_4), eight (T_8), twelve (T_{12}), and sixteen months (T_{16}), and the eight different factors. Then the correlations are found between the losses after four (L_4), eight (L_8), twelve (L_{12}), and sixteen months (L_{16}). The same data have been used in calculating the inter-correlations between the factors themselves. These correlations were computed according to the Pearson Product Moment Coefficient of Correlation.¹ Tables XV to XXXVI give the correlations and inter-correlations in tabulated form.

TABLE XV
SIMPLE CORRELATIONS BETWEEN RETENTION AND LOSS AFTER INTERVALS OF 0, 4, 8, 12, AND 16 MONTHS AND MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VI B				N = 30			
	MA*	CA	SP	IE	RC†	HIS	HT	WT‡
T_0	.683	— .075	.399	.755	.642	.626	.147	— .180
T_4	.597	— .034	.318	.741	.622	.538	.134	— .127
T_8	.512	— .064	.336	.679	.532	.512	.197	— .191
T_{12}	.536	— .106	.319	.779	.562	.596	.303	— .106
T_{16}	.550	— .010	.263	.781	.554	.601	.319	— .276
L_4	.377	— .161	.420	.352	.335	.521	.127	— .315
L_8	.434	— .043	.211	.349	.406	.429	— .141	.030
L_{12}	.449	— .100	.286	.164	.355	.228	— .313	.086
L_{16}	.316	— .139	.344	.064	.282	.148	— .331	.175

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

‡ These correlations are based on the actual weight divided by normal weight as shown in the Baldwin-Wood Weight-Height-Age Table.

¹ See Garrett, Statistics in Psychology and Education, p. 167.

TABLE XVI

SIMPLE CORRELATIONS BETWEEN MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VI B				N = 30		
	CA	SP	IE	RC†	HIS	HT	WT‡
MA*	— .269	.262	.533	.670	.343	— .201	— .197
CA		.174	.009	— .309	— .405	.149	.106
SP			.243	.331	.166	.025	— .205
IE				.594	.579	.286	.024
RC†					.599	— .051	— .163
HIS						.141	— .178
HT							— .152

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

‡ These correlations are based on the actual weight divided by normal weight as shown in the Baldwin-Wood Weight-Height-Age Table.

TABLE XVII

SIMPLE CORRELATIONS BETWEEN RETENTION AND LOSS AFTER INTERVALS OF 0 AND 8 MONTHS AND MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VI B				N = 28			
	MA*	CA	SP	IE	RC†	HIS	HT	WT
T ₀	.253	— .300	.505	.567	.383	.238	— .340	.108
T ₈	.244	— .270	.519	.493	.677	.333	— .395	.301
L ₈	— .122	— .063	.034	.122	— .032	— .075	.024	— .183

* Mental age determined by the Illinois General Intelligence Test.

† Reading comprehension determined by the Monroe Reading Comprehension Test.

TABLE XVIII

SIMPLE CORRELATIONS BETWEEN MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VI B				N = 28		
	CA	SP	IE	RC†	HIS	HT	WT
MA*	— .207	.331	.435	.270	.130	.484	.032
CA		— .099	— .185	— .306	.125	.647	— .141
SP			.431	.380	.524	— .232	.092
IE				.215	.361	— .349	— .079
RC					.111	— .116	.274
HIS						— .121	.008
HT							— .177

* Mental age determined by the Illinois General Intelligence Test.

† Reading comprehension determined by the Monroe Reading Comprehension Test.

TABLE XIX

SIMPLE CORRELATIONS BETWEEN RETENTION AND LOSS AFTER INTERVALS OF 0, 4, AND 8 MONTHS AND MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VI A				N = 122			
	MA*	CA	SP	IE	RC†	HIS	HT	WT
T ₀	.412	— .278	.424	.609	.448	.500	— .121	.000
T ₄	.210	— .285	.305	.640	.468	.505	— .087	— .060
T ₈	.365	— .261	.317	.636	.421	.541	— .070	— .022
L ₄	— .146	.053	.144	— .178	— .118	— .119	.030	.120
L ₈	— .058	.218	.029	— .194	— .077	— .205	.004	.052

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XX

SIMPLE CORRELATIONS BETWEEN MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VI A			N = 122			
	CA	SP	IE	RC†	HIS	HT	WT
MA*	— .051	.187	.339	.503	.342	.028	.021
CA		.118	— .088	— .098	— .062	.353	.004
SP			.298	.278	.421	.003	— .014
IE				.439	.311	.028	— .026
RC†					.341	.093	.047
HIS						.093	— .065
HT							— .040

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXI

SIMPLE CORRELATIONS BETWEEN RETENTION AND LOSS AFTER INTERVALS OF 0, 4, 8, AND 12 MONTHS AND MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VI A				N = 86			
	MA*	CA	SP	IE	RC†	HIS	HT	WT
T ₀	.339	— .290	.390	.751	.429	.427	— .125	.112
T ₄	.328	— .360	.280	.790	.509	.440	— .113	— .013
T ₈	.313	— .358	.326	.782	.479	.472	— .121	— .147
T ₁₂	.311	— .378	.369	.758	.421	.535	— .103	.011
L ₄	.007	.106	.082	— .284	— .247	— .114	— .008	.246
L ₈	— .063	.104	— .023	— .278	— .185	— .215	.021	.216
L ₁₂	— .101	.146	— .124	— .332	— .188	— .279	— .026	.143

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXII

SIMPLE CORRELATIONS BETWEEN MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VI A				N = 86		
	CA	SP	IE	RC†	HIS	HT	WT
MA*	— .020	.079	.333	.407	.251	.077	.107
CA		.018	— .320	— .119	.035	.427	— .041
SP			.319	.201	.501	— .110	.196
IE				.460	.312	— .061	.008
RC†					.217	.074	.127
HIS						.081	.007
HT							.001

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXIII

SIMPLE CORRELATIONS BETWEEN RETENTION AND LOSS AFTER INTERVALS OF 0, 4, 8, 12 AND 16 MONTHS AND MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VI A				N = 44			
	MA*	CA	SP	IE	RC†	HIS	HT	WT
T ₀	.242	— .373	.348	.678	.268	.570	— .269	.251
T ₄	.172	— .403	.263	.696	.283	.588	— .279	.136
T ₈	.201	— .394	.349	.718	.264	.654	— .295	.121
T ₁₂	.208	— .463	.427	.781	.245	.714	— .255	.169
T ₁₆	.259	— .423	.421	.693	.279	.719	— .259	.158
L ₄	.079	.124	.099	— .165	— .041	— .156	.074	.181
L ₈	— .0005	.238	— .115	— .323	— .086	— .366	.131	.176
L ₁₂	— .015	.214	— .296	— .317	— .081	— .439	.062	.095
L ₁₆	— .157	.260	— .297	— .341	— .147	— .487	.129	.054

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXIV

SIMPLE CORRELATIONS BETWEEN MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VI A				N = 44		
	CA	SP	IE	RC†	HIS	HT	WT
MA*	.097	.169	.168	.095	.368	.196	.222
CA		— .163	— .332	.199	— .045	.573	— .186
SP			.455	.351	.522	— .162	.176
IE				.298	.525	.235	.198
RC†					.445	.195	.296
HIS						— .018	— .104
HT							.089

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXV

SIMPLE CORRELATIONS BETWEEN RETENTION AND LOSS AFTER INTERVALS OF 0, 4 AND 8 MONTHS AND MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VII B				N = 107			
	MA*	CA	SP	IE	RC†	HIS	HT	WT
T ₀	.371	-.252	.611	.664	.429	.458	-.169	.035
T ₄	.339	-.265	.574	.609	.485	.531	-.143	.032
T ₈	.378	-.232	.518	.534	.475	.603	-.113	-.013
L ₄	.039	-.089	.236	.241	.005	-.067	-.136	.102
L ₈	.130	-.110	.308	.400	.029	-.106	-.120	.088

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXVI

SIMPLE CORRELATIONS BETWEEN MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VII B			N = 107			
	CA	SP	IE	RC†	HIS	HT	WT
MA*	— .070	.215	.295	.463	.301	— .039	— .086
CA		— .068	— .508	— .277	— .204	.358	— .087
SP			.415	.262	.316	— .096	.081
IE				.399	.339	— .237	— .002
RC†					.508	— .022	— .059
HIS						.020	— .122
HT							— .007

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXVII

SIMPLE CORRELATIONS BETWEEN RETENTION AND LOSS AFTER INTERVALS OF 0, 4, 8, 12 AND 16 MONTHS AND MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VII B				N = 64			
	MA*	CA	SP	IE	RC†	HIS	HT	WT
T ₀	.386	-.471	.588	.805	.448	.366	-.343	.044
T ₄	.320	-.396	.528	.711	.557	.497	-.270	.043
T ₈	.359	-.420	.502	.695	.570	.530	-.231	-.008
T ₁₂	.310	-.430	.499	.653	.577	.581	-.187	.008
T ₁₆	.249	-.486	.512	.670	.574	.614	-.251	.038
L ₄	.107	-.286	.302	.468	-.054	-.094	-.274	.077
L ₈	.202	-.254	.367	.549	-.072	-.169	-.320	.205
L ₁₂	.228	-.145	.326	.531	-.035	-.177	-.332	.068
L ₁₆	.322	-.102	.349	.487	-.008	-.209	-.249	.006

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXVIII

SIMPLE CORRELATIONS BETWEEN MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VII B				N = 64		
	CA	SP	IE	RC†	HIS	HT	WT
MA*	— .135	.164	.313	.470	.267	— .072	— .072
CA		— .246	— .483	— .374	— .384	.355	— .215
SP			.505	.199	.175	— .216	.084
IE				.477	.409	— .350	.174
RC†					.601	— .041	— .255
HIS						— .074	.157
HT							— .017

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXIX

SIMPLE CORRELATIONS BETWEEN RETENTION AND LOSS AFTER INTERVALS OF 0, 4, 8 AND 12 MONTHS AND MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VII A				N = 120			
	MA*	CA	SP	IE	RC†	HIS	HT	WT
T ₀	.707	— .324	.248	.506	.596	.410	.124	— .147
T ₄	.530	— .312	.254	.615	.619	.471	— .149	— .110
T ₈	.484	— .311	.288	.625	.604	.525	— .105	— .111
T ₁₂	.476	— .089	.281	.626	.617	.514	— .150	.132
L ₄	.257	.010	— .050	— .274	— .135	— .190	.023	.001
L ₈	— .149	.014	— .082	— .198	.008	— .290	— .002	— .008
L ₁₂	.005	.039	— .087	— .290	— .101	— .213	.049	.070

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXX

SIMPLE CORRELATIONS BETWEEN MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VII A				N = 120		
	CA	SP	IE	RC†	HIS	HT	WT
MA*	— .058	.068	.392	.532	.357	— .051	— .032
CA		— .227	— .402	— .264	— .100	.344	— .134
SP			.432	.217	.017	— .154	.122
IE				.493	.255	— .267	— .160
RC†					.450	— .097	— .153
HIS						— .048	— .097
HT							— .036

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXXI

SIMPLE CORRELATIONS BETWEEN RETENTION AND LOSS AFTER INTERVALS OF 0 AND 8 MONTHS AND MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VII A							N = 86
	MA*	CA	SP	IE	RC†	HIS	HT	WT
T ₀	.286	— .169	.316	.592	.362	.463	.071	.003
T ₈	.237	— .223	.392	.609	.325	.569	.004	.014
L ₈	.142	— .028	— .128	.050	.122	— .069	.173	.008

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXXII

SIMPLE CORRELATIONS BETWEEN MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VII A							N = 86
	CA	SP	IE	RC†	HIS	HT	WT	
MA*	— .027	.050	.311	.394	.301	.125	.015	
CA		— .006	— .285	— .141	— .085	.314	.038	
SP			.314	.192	.528	— .028	.236	
IE				.440	.409	.054	.007	
RC†					.204	.074	.132	
HIS						— .048	.122	
HT							.143	

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXXIII

SIMPLE CORRELATIONS BETWEEN RETENTION AND LOSS AFTER INTERVALS OF 0 AND 4 MONTHS AND MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VIII B							N = 62
	MA*	CA	SP	IE	RC†	HIS	HT	WT
T ₀	.322	— .287	.235	.646	.528	.533	.018	— .079
T ₄	.167	— .226	.234	.634	.567	.564	— .021	— .095
L ₄	.127	— .018	— .073	— .184	— .233	— .217	.041	— .054

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXXIV

SIMPLE CORRELATIONS BETWEEN MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VIII B				N = 62		
	CA	SP	IE	RC†	HIS	HT	WT
MA*	— .104	.088	.225	.227	.312	— .164	— .066
CA		— .193	— .190	.415	— .171	.397	— .058
SP			.341	.477	.281	— .028	— .007
IE				.467	.615	— .115	— .003
RC†					.589	.197	.210
HIS						— .016	.134
HT							— .186

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXXV

SIMPLE CORRELATIONS BETWEEN RETENTION AND LOSS AFTER INTERVALS OF 0, 4, AND 8 MONTHS AND MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VIII B				N = 27			
	MA*	CA	SP	IE	RC†	HIS	HT	WT
T ₀	.512	— .569	.001	.490	.430	.484	.062	— .172
T ₄	.366	— .482	.084	.624	.547	.565	— .199	— .376
T ₈	.385	— .455	.110	.610	.552	.604	— .182	— .373
L ₄	.015	.089	— .185	— .390	— .333	— .299	.223	.351
L ₈	— .027	.054	— .157	— .361	— .342	— .331	.020	.345

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

TABLE XXXVI

SIMPLE CORRELATIONS BETWEEN MENTAL AGE, CHRONOLOGICAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, HISTORY, HEIGHT, AND WEIGHT

	GRADE VIII B				N = 27		
	CA	SP	IE	RC†	HIS	HT	WT
MA*	— .241	.000	.331	.261	.411	.120	— .247
CA		— .009	— .194	— .460	— .191	.251	.165
SP			.318	.467	.195	.036	.219
IE				.547	.752	.187	— .005
RC†					.441	— .303	.088
HIS						.285	— .242
HT							— .010

* Mental age determined by the McCall Multi-Mental Test.

† Reading comprehension determined by the Chapman Reading Comprehension Test.

The means and ranges of the correlation between the history retention tests and the eight factors are given in Table XXXVII.

TABLE XXXVII
MEANS AND RANGES OF THE CORRELATIONS BETWEEN HISTORY
RETENTION AND THE FACTORS

	Mental age	Chronological age	Subject preference	Interest and effort
Mean	.366	— .303	.359	.664
Range	.167 to .707	— .010 to — .569	.001 to .611	.490 to .805
	Reading comprehension	Standard history	Height	Weight *
Mean	.483	.526	— .098	— .023
Range	.245 to .677	.238 to .719	— .395 to .319	— .376 to .301

* These correlations are based on the actual weight divided by normal weight as shown in the Baldwin-Wood Weight-Height-Age Table.

According to Table XXXVII, the mean correlation between retention and mental age is .366, with a range from .167 to .707. Hence, throughout this study, there is a slight relationship between retention and mental age; that is, the children with the higher mental ages tend to remember better than those with lower mental ages.

There is a mean of the Pearson r 's between retention and chronological age of — .303, while the range of the correlations extends from — .010 to — .569. Consequently, there is a low negative relationship between retentiveness and chronological age, which signifies that, in general, the older children in our classrooms are doing less retaining of their history knowledge.

The Pearson r 's between retentiveness and subject preference have a mean of .359 with a range of .001 to .611. From these data, it is safe to conclude that there are low, yet in some instances significant, correlations between retention and preference for history. That is, the children who like history tend to retain it.

Table XXXVII shows that the highest mean correlation exists between retention and the factor, interest and effort, since it is .664 with a range from .490 to .805. Such measures of relationship make it possible to conclude definitely that there is a positive relation between ability to retain and the interest and effort which children put forth to master a school subject—in this instance, history.

A mean correlation of .483 with a range from .245 to .677 is found between retention and reading comprehension. Consequently, ability to read tends to be an asset to remembering.

The second highest mean of the Pearson r 's exists between retention and the achievement scores on a standard history test, since the mean is .526, with a range that extends from .238 to .719. If we seek an explanation of this relationship between ability on a standard test and the retention of "grade" history, it is probably found in the fact, that the standard test represents a fund of familiar information—the apperceptive mass. The greater the amount of this "old" knowledge, the better are the chances to associate the "new" history material with it. To education, such a conclusion implies the need for the constant enrichment of the curriculum.

There is a slight negative mean correlation, $-.098$, between retention and height. However, the range for the Pearson r 's varies from $-.395$ to $.319$. In a word, there is little relationship between remembrance of history and a physical measure, the height of children. Practically the same condition exists for retentiveness and weight, since there is a mean correlation of $-.023$, with a range from $-.376$ to $.301$. The conclusion is that there is no relationship between weight and retention.

In summary, these data show positive, though low, relationships between retention and mental age, subject preference, and reading comprehension. There are higher positive relationships between retention and interest and history and ability on a standard test. The relationship between retention and chronological age is consistently negative. For height and weight, the relationships are too insignificant and variable to have any predictive values.

B. COMBINED FACTORS

What factors are significant of ability to retain history?

To secure the data for answering this question, coefficients of partial² and multiple³ correlations and coefficients of alienation² were computed between the initial history test and the retention tests and the eight different factors.

In all, there are about 750 partial and multiple correlations which are given in Tables XXXVIII and XXXIX.

² Garrett, *Statistics in Psychology and Education*, pp. 239, 241-242,

244.

³ Kelley, *Statistical Method*, p. 299.

TABLE XXXVIII
PARTIAL CORRELATIONS BETWEEN THE RETENTION HISTORY TESTS AND MENTAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, AND STANDARD HISTORY TEST

Grade	VI B		VI A	VI A	VI A	VII B	VII B	VII A	VII A	VIII B	VIII B
No. of cases	30		86	44	107	64	120	86	62	27	
Time interval	Mo.	16 Mo.	Mo.	12 Mo.	Mo.	Mo.	16 Mo.	Mo.	12 Mo.	Mo.	Mo.
r _{13.5*}	.654	.516	.336	.304	.198	.210	.308	.320	.377	.195	.714
r _{13.2}	.509	.252	.142	.095	.177	.363	.244	.273	.238	.055	.641
r _{13.6}	.444	.288	.200	.169	.226	.243	.215	.202	.222	—	.029
r _{13.4}	.641	.459	.231	.214	.087	.243	.215	.202	.222	.112	.059
r _{15.2}	.342	.121	.351	.390	.321	.174	.164	.491	.383	.355	.272
r _{15.6}	.257	.101	.423	.386	.287	.230	.343	.320	.282	.359	.572
r _{15.4}	.386	.207	.451	.427	.272	.117	.225	.138	.075	.077	.555
r _{12.6}	.602	.670	.537	.486	.514	.554	.690	.700	.651	.666	.596
r _{12.4}	.620	.664	.532	.423	.551	.585	.720	.739	.543	.536	.606
r _{16.4}	.430	.303	.370	.692	.341	.299	.382	.371	.019	.066	.257
r _{14.2}	.357	.292	.044	.191	.412	.470	.306	.483	.344	.578	.330
r _{12.4}	.183	....	....	....	....	....	.108	....	.108	....	.346
r _{16.4}	.295	....	....	....	....	....	.156	....	.156	....	.125
r _{15.4}	.221	....	....	....	....	....	.050	....	.050	....	.133
r _{13.2}	.050	....	....	....	....	....	.164	....	.164	....	.224
r _{13.4}	.437	....	....	....	....	....	.277	....	.277	....	.215
r _{16.4}	.379	....	....	....	....	....	.423	....	.423	....	.281
r _{12.45}	.606	.651	.464	.341	.558	.576	.708	.734	.543	.535	.530
r _{16.45}	.360	.239	.082	.313	.286	.412	.370	.362	.097	.079	.228
r _{16.45}	.346	....	....	....	....	....	.412	....	.412	....	.256
r _{12.45}	.359	....	....	....	....	....	.395	....	.395	....	.283
r _{12.45}	.485	.280	.044	.094	.307	.441	.280	.476	.026	.081	.180
r _{14.23}	.619	.433	.103	.094	.189	.223	.285	.227	.044	.011	.244
r _{16.452}	.203	.047	.225	.634	.159	.095	.122	.096	.023	.124	.139
r _{13.452}	.599	.230	—	.032	.066	.097	.113	.042	.069	.028	.175

1 = Retention Tests after Certain Time Intervals.

3 = Mental Age.

4 = Pressy-Richards Standard History Test.

5 = Subject Preference.

6 = Reading Comprehension.

* r_{13.5} = .654 means that the partial correlation between retention tests after an interval of 6 Mos. and mental age, reading comprehension rendered constant, is .654; etc.

TABLE XXXIX
MULTIPLE CORRELATIONS BETWEEN THE RETENTION HISTORY TESTS AND MENTAL AGE, SUBJECT PREFERENCE, INTEREST AND EFFORT, READING COMPREHENSION, AND STANDARD HISTORY TEST

[illegible]

1 = Retention Tests after Certain Time Intervals.
2 = Interest and Effort.
3 = Mental Age.
4 = Pressey-Richards Standard History Test.
5 = Subject Preference.
6 = Reading Comprehension.

* $R_{1.53} = .720$ means that the multiple correlation between retention tests after an interval of 6 Mos. and a combination of subject preference and mental age is .720; etc.

For consideration here, the ranges of the multiple and corresponding partial correlations are given in Tables XL and XLI. Now, Table XL gives the lowest and highest mul-

TABLE XL
RANGES AND MEANS FOR MULTIPLE CORRELATIONS OF
THE RETENTION AND THE FACTORS

(a)*	R 1.24	= .520 to .822	Mean = .699
(b)	R 1.245	= .581 to .834	Mean = .722
(c)	R 1.243	= .522 to .853	Mean = .723
(d)	R 1.2456	= .600 to .840	Mean = .737
(e)	R 1.2453	= .598 to .860	Mean = .738

TABLE XLI
RANGES FOR THE PARTIAL CORRELATIONS
OF THE RETENTION AND FACTORS

(a)*	r 12.4	= .217 to .739
(a)	r 14.2	= .200 to .483
(b)	r 12.45	= .256 to .692
(c)	r 14.23	= .094 to .385
(d)	r 16.452	= .308 to .171
(e)	r 13.452	= -.032 to .509

KEY

- * Same groups.
- 1 = Retention Test.
- 2 = Interest and Effort.
- 3 = Mental Age.
- 4 = Standard History Test.
- 5 = Subject Preference.
- 6 = Reading Comprehension.

tiple correlations found in this study, while the partial correlations designated by (a), (b), (c), etc., given in Table XLI are not for the highest and lowest partial in the investigation, but are for the groups corresponding to the (a), (b), (c), etc., of the multiple correlations. Therefore, the ranges of the partials are given to help explain the multiple correlations.

According to Table XL (a), the lowest multiple correlation for a combination of interest and effort and ability to pass a standard history test for the criterion, history retention, is .520 while the highest is .822, averaging .699. Hence, a combination of these two factors gives ability to retain. On the other hand, Table XLI (a) shows that when the ability to pass a standard test is partialled out, correlations of .217 and .739 are found for the corresponding

groups. When the factor, interest and effort, is held constant, the partials are .200 and .483, therefore interest and effort are of consequence to retentiveness.

Coming back to Table XL (b), a combination of interest and effort, ability on a standard test, and subject preference have multiple correlations that range from .581 to .834, averaging .722. Table XLI (b) shows that when the ability on a standard history test and subject preference are partialled out, that the correlations are .256 and .692, respectively. Again (c) in Table XL shows that a combination of interest and effort, ability on a standard test, and mental age give multiple correlations that range from .522 to .853. When interest and effort and mental age are partialled out the correlations drop to .094 and .385, respectively. There is no need to question the significance of interest and effort and mental age in influencing retention.

The multiple correlations in Table XL (d) for a combination of interest, and effort, ability on a standard history test, subject preference, and reading comprehension range from .600 to .840. Therefore, a combination of these four factors are of vital consequence in history retention. A glance at the partials given in (d) Table XLI show .308 and .171, respectively. These figures reveal what has already been suggested—the great importance of a combination of interest and effort, ability on the standard test, and subject preference in predicting successful history retention.

Lastly, (e) Table XL shows that a combination of interest and effort, ability on the standard test, subject preference, and mental age give multiple correlations that range from .598 to .860, averaging .738. On the other hand, (e) Table XLI shows that partialling out ability to pass a standard test, subject preference, and interest and effort give correlations that range from $-.032$ to .509. Again, as in (d), this negative partial and the low positive correlation shows the great significance to retention of school history of the three factors partialled out.

In conclusion, several outstanding facts are worthy of mention as a result of this attempt to answer the question,

What factors are significant of ability to retain history? First, a combination of interest and effort and ability to pass a standard test gives high multiple correlations that range from .520 to .822, averaging .699. Second, when subject preference is added to these two factors, the multiple correlations range from .581 to .834, averaging .722. Third, a combination of interest and effort, ability on a standard history test, and mental age gives multiple correlations that range from .522 to .853, averaging .723. Fourth, combining interest and effort, ability on a standard test, subject preference, and reading comprehension gives multiple correlations which range from .600 to .840, averaging .737. These four factors give high prediction for ability to retain history. And, fifth, substituting mental age for reading comprehension gives multiple correlations that range from .598 to .860, averaging .738. Hence, all or even some of these factors tend to assure ability to retain. Our X groups possess many of these in varying degrees. Proceeding on this assumption, homogeneous grouping is an educational procedure that provides for the different abilities to retain.

CHAPTER 7

SUMMARY OF CONCLUSIONS

SPECIFIC CONCLUSIONS

1. The mean amounts of history retained after intervals of four, eight, twelve, and sixteen months are 86.01 per cent., 81.51 per cent., 76.72 per cent., and 71.96 per cent., respectively. It is worthy of note that after 16 months the children know 72 per cent. of the history which they knew at the end of the semester.

2. The mean amounts of history forgotten after intervals of four, eight, twelve, and sixteen months are 13.99 per cent., 18.49 per cent., 23.28 per cent., and 28.04 per cent., respectively. Accordingly, the largest amount of forgetting is from the initial to the four-month interval.

3. After an interval of four months, the mean amounts retained in grades six, seven and eight are 86.07 per cent., 87.54 per cent., and 81.99 per cent., respectively; after eight months, 81.26 per cent., 82.39 per cent., and 77.35 per cent., respectively. We do not know the differences for the eighth grade after twelve and sixteen months, so cannot compare retention by grades for longer intervals.

4. The mean correlations between the initial history test and the tests after four, eight, twelve, and sixteen months are .838, .797, .839, and .840, respectively, showing a high positive relationship between the initial test and the tests after delayed intervals. At this point it is helpful to recall the notable sentence of Thorndike, "The relation between retention of the effects of an experience for one or two minutes and their retention for one or two days seems to be one of the closest yet measured in human nature."

5. The mean correlations between the initial retention test and forgetting after four, eight, twelve, and sixteen months are .238, .273, .145, and .298, respectively. Prevailing low

relationships exist between the amount known after learning ceases and the forgetting. But, when we note the close relationships in (4), we conclude that the pupils who made the best scores can lose more than those who made the lower scores and still remain up among the honored few.

6. History knowledge which is concrete and personal tends to be well remembered. The historic episodes which have been emphasized in the teaching are retained after long intervals. As a result, history instruction needs to stress the high points through enrichment of subject matter, frequent use of pictures, posters and cartoons, and dramatizations, and to provide pupil participation wherever possible in the history classes.

7. The kinds of history knowledge which are forgotten relate to a confusion of names and geographical locations, and to an inability to understand thoroughly and retain abstractions and technicalities of legal documents and government.

8. When groups of boys and girls are equated on the bases of interest and effort and ability on the Pressey-Richards Test in the Understanding of American History, the boys are found to be slightly superior to the girls in retention. The boys retain a mean amount of 1.32, 1.18, and 3.11 more than the girls after a year's interval.

9. Mental age and retention are positively related. Yet, there are variations in the relationships for the different groups, since the Pearson r 's range from .167 to .707, averaging .366.

10. A negative relationship exists between chronological age and the retention, since the Pearson coefficients of correlation range from $-.010$ to $-.569$, averaging $-.303$. This shows that the oldest pupils in our classrooms generally forget the most.

11. A positive relationship exists between subject preference and retention. The correlations range from .001 to .611 and average .359. Hence, the children who enjoy history are likely to remember more of it than those who do not care for it.

12. Interest and effort and retention show a positive relationship, for the Pearson r 's range from .490 to .805, averaging .664. It is of practical importance, therefore, for the history teacher to keep in mind Dewey's expression, "The problem of educators, teachers, the state, is to provide the environment that induces educative or developing activities, and where these are found the one thing needful in education is secured."¹

13. Reading comprehension and retention show positive relationships, since the Pearson r 's range from .245 to .677, averaging .483.

14. The Pressey-Richards Test in the Understanding of American History and the retention test reveal positive relationships, for the Pearson r 's range from .238 to .719, averaging .526. No doubt, the significant relationship existing between the standard history test, prepared for children far and wide, and typical classroom history is due to associations of the "old" and "new" knowledge, respectively. "The progress of knowledge," says Thorndike, "is far less a matter of acquaintance with more and more gross situations in the world than it is a matter of insight into the constitution and relations of long familiar ones."²

15. The relationships between retention and height and weight are too low to have predictive value; the Pearson r 's between the retention tests and height range from $-.395$ to $.319$, averaging $-.098$, while the Pearson r 's between these tests and weight range from $-.376$ to $.301$, averaging $-.023$.

16. A combination of interest and effort and ability to pass a standard history test gives multiple correlations ranging from .520 to .822, averaging .699. When subject preference is added to this combination, the coefficients range from .581 to .834, averaging .722. If, instead of subject preference, we add mental age, the coefficients range from .522 to .853, averaging .723.

¹ Dewey, J.: *Interest and Effort in Education*. Riverside Educational Monographs, Houghton Mifflin Company, p. 96, 1913.

² Thorndike, E. L.: *Educational Psychology, Briefer Course*. Teachers College, Columbia University, p. 148, 1923.

By combining interest and effort, ability on the standard history test, subject preference, and reading comprehension, we get multiple correlations ranging from .600 to .840, averaging .739. If we substitute mental age for reading comprehension, the coefficients range from .598 to .860, averaging .738.

GENERAL CONCLUSIONS

The following conclusions may be drawn subject to the conditions of this investigations in respect to classroom instruction.

1. The greatest amount of forgetting is found to take place early after the initial test. Therefore, pupils should be given reviews and examinations soon after learning rather than after long delays. The curve of forgetting shows a much more rapid loss from the initial test to the four-month interval than there is during any of the later intervals. The curve gradually approaches a horizontal line. In a word, there is negative acceleration.

2. This experiment shows that forgetting of history is much less than that in the classical experiments by Ebbinghaus and Radossawljewitsch, where nonsense material and poetry were used. The practical suggestion for educational procedure is that the history should be presented in a manner to appeal to the various interests of the child, and should be rich in associations. Therefore, enrichment of the curriculum for all children may aid retention. The better the history is taught, so that it is better learned by the child, the longer it will be retained.

3. In the light of the evidence supplied by the present investigation, there are no significant grade variations in the retention of history. On the other hand, the different groups within a grade are more variable than the different grades.

4. The relative standing of the pupils is much the same after an interval of sixteen months as after an interval of four months. Consequently, lengthening the time intervals seems to make very little change in the relationships of children within given groups.

5. Chronological age has a negative effect on retention. In general, the older children do more forgetting than the younger children in our classrooms. Height and weight have little bearing on retention. The more important factors are mental age, subject preference, interest and effort, reading comprehension, and ability to pass a standard history test—the Understanding of American History by Pressey and Richards. Boys are slightly superior to girls in the retention of history.

6. A combination of (a) interest and effort, and (b) ability on a standard history test gives a closer prediction than any other “two” factors. The addition of mental age gives the “three” factors having the greatest influence on retention. Combining (a) interest and effort, (b) ability on the standard history test, (c) subject preference, and (d) mental age, gives the highest prediction for the retention of history in the sixth, seventh, and eighth grades.

7. These results show the value of interest and effort for the retention of history; that the child who likes the subject is more likely to remember it; that knowing a good deal of the subject is an aid to retention; that training in reading comprehension—leading the child to really understand what he is reading—is also an aid to retention; and that children with higher mental ages need an opportunity for contact with more of the subject, since they can learn more rapidly and remember more than those having lower mental ages. The gifted children can derive much benefit not only from a chance to progress rapidly through school but also from an enriched program. Since fast learning insures slow forgetting, the clever children in school can learn more of a subject and still retain more of it than the slower children. These suggest the value of an enriched curriculum.

CHAPTER 8

HISTORICAL SURVEY OF THE LITERATURE ON RETENTION

In the brief survey of the literature on retention which follows, an attempt is made to group studies which are similar; nevertheless, many of these overlap. Inasmuch as these experiments make contributions to psychology and education, the practical suggestions receive emphasis in this account.

I. LABORATORY EXPERIMENTS TO DETERMINE RETENTION AND FORGETTING

So far, there have been many laboratory investigations in the field of retention and forgetting.¹ H. Ebbinghaus (1885) is the harbinger of experimentation in forgetting. His material consisted of nonsense syllables. Again and again, he read over these series until he could produce them "once" without an error. Ebbinghaus, who was both subject and experimenter, concluded that one-third of forgetting nonsense syllables occurred during the first twenty minutes, then more than one-third in the first hour, nearly two-thirds in nine hours, and more than two-thirds within twenty-four hours. From these data, he derived his classical Ebbinghaus curve of forgetting; namely, large and rapid forgetting early after learning, followed by a gradual slowing up of the process.² This study still has a great influence in the educational world, since many teachers think that such a small amount of what children learn is retained. Hence, the incessant drilling during the school year, but especially in the fall, to counteract all the pupils have forgotten over the summer vacation.

¹ See Annotated Bibliography for references other than those treated here.

² Ebbinghaus, H.: *Ueber das Gedächtnis. Untersuchungen zur experimentellen Psychologie*. Leipzig, Duncker und Humboldt, 1885.

P. R. Radossawljewitsch (1905) carried on an experiment in forgetting. With twenty-seven subjects, both adults and children, this investigator used nonsense syllables, similar to those of Ebbinghaus. These syllables were fixed on a cylinder that rotated so as to expose one syllable at a time through an opening. Radossawljewitsch used meaningful material, each series consisting of two stanzas of Schiller's translation of "The Siege of Troy." The reagents read this material over and over, until they could reproduce it "twice" without an error. By relearning both kinds of subject matter after various intervals, the number of repetitions in learning and relearning became the measure of gain and loss. His results show that, when material is learned to two complete reproductions, only one-third is forgotten after 24 hours. Again, such a large amount of forgetting early after learning strengthens teachers in the belief that continued drills are needed; these are often given at the expense of the child's interest and understanding. A glance at the surveys, both in our states and cities, shows the extent to which the uninteresting drill work is sometimes carried. Radossawljewitsch concluded that people forget rapidly at first, then much more slowly, and, with a lengthening of time, forgetting gradually decreases. His curve of forgetting is, in general, similar to that of Ebbinghaus. Very instructive, indeed, is another of his conclusions, "Das Vergessen des sinnlosen Materials ist fast bei allen Zeitintervallen grösser als des sinnvollen."³ (The forgetting of nonsense material is greater in almost all of time intervals than that of meaningful material.) Consequently, teachers can aid retention by making the material more meaningful. Both the experiments of Ebbinghaus and of Radossawljewitsch are classics because of the careful analysis of their data and the valuable conclusions.

An experiment in ball tossing by E. J. Swift (1905) consisted in keeping two balls going with the right hand, and, likewise, with the left hand. Over 600 days intervened between practice and relearning. In the language of the author,

³ Radossawljewitsch, P. R.: *Das Fortschreiten des Vergessens mit der Zeit*. Göttingen, Druck der Dieterich'schen Univ.-Buchdruckerei. W. F. Kaestner, p. 182, 1905.

"The results of the tests seem to show that the nervous system had forgotten little or nothing and that whatever loss of skill the strangeness of the movements during the first and second trials indicated was chiefly muscular."⁴

Somewhat similar to Swift's ball tossing experiment is that of W. F. Book (1908) in typewriting. Book learned that there is an actual average gain of 103 strokes per day over the records made during the last 10 regular tests; or, if the errors are subtracted, there is an average net gain of 85 strokes per day. However, there are 10-minute practice periods each day prior to the retention test for the typewriting skill. "The skill cannot be recalled," states Book, "by a sheer act of will but requires the exercise of the muscles themselves to re-establish the chain of subconscious reflexes."⁵

C. Tsai (1924) made a comparative study of retention curves for motor habits. Seventy-five men and women in elementary psychology acted as the subjects in determining remembrance of the stylus Maze Habit. According to the results, all groups exhibit a high degree of individual variability. Some individuals retain all the habit almost perfectly after an interval of nine weeks, while others lose practically all that they have learned after an interval of two weeks. Briefly, negative acceleration for human beings and linear acceleration for rats are characteristic of the evidence supplied by this study.⁶

In two experiments, E. L. Thorndike (1901 and 1908) tested, first, the memory for words and numbers, and, second, the memory for paired associates. His first experiment shows a correlation between brief and delayed retention, in the case of unconnected material, to be about .90. Scarcely anywhere in the literature on retention, do we find a more illumi-

⁴Swift, E. J.: Memory of a Complex Skilful Act. *American Journal of Psychology*, Vol. 16, pp. 131-133, 1905.

⁵Book, W. F.: The Psychology of Skill: with Special Reference to the Acquisition in Typewriting. University of Montana Publications of Psychology, Bulletin No. 53, Psychological Series, No. 1, 1908.

⁶Tsai, C.: A Comparative Study of Retention Curves for Motor Habits. *Comparative Psychology Monographs*, Williams and Wilkins Co., Baltimore, Maryland, pp. 29, 1924.

nating statement than Thorndike's own words. "The relation between retention of the effects of an experience for one or two minutes and their retention for one or two days thus seems to be one of the closest yet measured in human nature."⁷

The second experiment by Thorndike (1908) used 22 adults—seniors or graduate students. The material included the English meanings of 1200 German words, which are divided into 120 sets of 10 each. After hours of study, and when the student felt reasonably sure that he knew the words, he took a test on the paired associates. In this instance the conclusions are: "The group of 22 individuals being taken as the unit, we may say that 30 hours of study, plus eight hours of testing, give command of 1030 words for three days and of 620 of them for 42 days. The loss in a month and a third between the three days later and the 42 days later test is thus only 40 per cent." When we recall that Ebbinghaus and Radossawljewitsch have losses of two-thirds and one-third for nonsense material, respectively, after 24 hours, we can, indeed, be interested in Thorndike's following conclusion: "It would not be far amiss to say that the central tendency would be a loss of a twentieth in an hour, a tenth in three days, and between four and five-tenths in 40 days."⁸ Of course, the connections which the paired associations involve help to account for the much smaller amount of forgetting than when lists of meaningless syllables are used. As a pertinent contribution to education, this conclusion is worthy of note, for we, who are teachers, need to emphasize all possible relationships which may exist in the content of the lessons presented to children.

C. H. Bean (1912) carried on a retention investigation in the Indiana State Normal School. His subjects consisted of college sophomores—men and women. A series of letters were shown on a screen. Bean writes that, "By means of

⁷ Thorndike, E. L.: The Relation between Memory for Words and Memory for Numbers and the Relation between Memory over Short and Memory over Long Intervals. *American Journal of Psychology*, Vol. 21, pp. 487-8, 1901.

⁸ Thorndike, E. L.: Memory for Paired Associates. *Psychological Review*, Vol. 15, pp. 122-138, 1908.

rhythmical repetitions the rapid learners decrease their errors due to forgetting 87 per cent.; the medium learners also diminish their errors nearly 85 per cent., but the slow learners lose 25 per cent. more. These variations do not make a gradual transition from large through medium to slight change in the rate of forgetting; but we can state with some degree of assurance that rhythm aids rapid learners, and hinders slow ones."⁹

A. I. Gates (1918) conducted a study to determine the correlations on immediate and delayed recall. The subjects were elementary school children (grades 3-8). The children worked in squads of about eight each. The material consisted of nonsense syllables, but also included biographies. Usually, the amount of material at each retest was such that the best subjects could recall from 75 to 90 per cent. In this investigation, the conclusion are singularly valuable. Gates concludes, "A positive and high (0.73 to 0.89) correlation exists between immediate recall and delayed recall when both functions are measured by absolute amounts."¹⁰

Another experiment to determine the conditions of retention is that of C. W. Luh (1922). As in nearly all of the preceding investigations, this study used nonsense syllables. The subjects spelled each syllable letter by letter, as it was exposed on a rotating drum. With the successful anticipation of every syllable a series was considered to be learned. All series were learned by successive presentations in a single sitting. There were twenty subjects in the study. For the most part, these conclusions are in harmony with the results of earlier investigations.¹¹

Realizing the wide gulf between the recall of nonsense syllables, numbers, and lists of words as compared with the retention of experiences in life, J. A. McGeoch and P. L. Whitley (1926) undertook to measure the recall of briefly

⁹ Bean, C. H.: The Curve of Forgetting. *Archives of Psychology*, No. 21, pp. 49, 1912.

¹⁰ Gates, A. I.: Correlations of Immediate and Delayed Recall. *Journal of Educational Psychology*, pp. 489-495, 1918.

¹¹ Luh, C. W.: The Conditions of Retention. *Psychological Monographs*, Vol. 31, pp. 87, 1922.

observed material. For 30 seconds groups of sophomores, men and women, observed the Binet object card. This is a rectangular orange-yellow cardboard. Attached to it are two photographs, a red and white label, a white button, a one-cent stamp, and a penny. Four groups recalled in the form of a written narrative, four other groups recalled in the form of answers to an interrogatory of questions. Time intervals were 30, 60, 90, and 120 days. According to the results, only 45.3 per cent. of the material is forgotten after 120 days. In the case of the narrative reproduction, the forgetting is much greater than when it is measured by answers to definite questions. May not the teachers who, today, use examinations in the form of 40 or 50 true-false, completion, and multiple-choice questions get better records for the geography, history, literature, etc., which they have taught three or four months previously, than those who still adhere to the long, tiresome essay questions? For after all the answer to this question involves a situation comparable to the findings of McGeoch and Whitley.¹²

To sum up, many laboratory experiments have been performed to determine retention and forgetting since the classical study of Ebbinghaus. For the most part, the material used consists of nonsense syllables, figures, lists of words and poetry. As they stand, evidence points to the conclusion that forgetting ranges from two-thirds after 24 hours (Ebbinghaus, 1885) to 45.3 per cent. after 120 days (McGeoch and Whitley, 1926). The curves of forgetting descend rapidly early after learning, and then gradually approach a horizontal line. Although these studies make many contributions to psychology and education there is a danger in assuming that school learning and forgetting, especially, conform to the same conditions.

2. EVIDENCES OF REMEMBERING

Standing in a class by themselves are some exceptionally fine investigations that give evidences of remembering. Two

¹² McGeoch, J. A., and Whitley, P. L.: *The Recall of Observed Material*. *The Journal of Educational Psychology*, Vol. 17, pp. 419-425, 1926.

of these are considered here. The first is by P. B. Ballard (1913), who attempted to ascertain the improvement which sometimes precedes forgetfulness. The material consisted of 34 lines from the "Ancient Mariner." Altogether, 5192 elementary children were involved. These were tested immediately after learning the poetry and, then, again after one, two, or seven days. After studying the poetry for 15 minutes, the children wrote as much of it as they could remember. His results are:

After an interval of 1 day, there is a loss of 1.6 per cent.
 After an interval of 2 days, there is a gain of 9.4 per cent.
 After an interval of 3 days, there is a gain of 6.1 per cent.
 After an interval of 4 days, there is a loss of 2.0 per cent.
 After an interval of 5 days, there is a loss of 5.8 per cent., etc.

Thus, we find improvement early after learning.¹⁸

The second experiment which shows reminiscence is that of W. Brown (1923). His subjects were taken from an elementary course in psychology. For five minutes they wrote the names of as many states as they could remember. Thirty minutes later they repeated the performance. The results show a net gain per list of more than three states. When these gains are analyzed, over 13 per cent. of the items of the second list are not given on the first, while only 5 per cent. of the first list are not given in the second recall. Brown explains the improvement in the following manner: "The group of facts is readily understandable on the assumption that the list of items which can be recalled at any given time is determined part by association cues or stimuli which only happen to be present that time, but which are adequate to insure the recall of several weak items. At another time a somewhat different set of cues will be present, a somewhat different list of items will be recalled. But this is not generally observed because (a) the process of forgetting tends to lop off the weaker items of the list and prevent

¹⁸ Ballard, P. B.: Obliviscence and Reminiscence. *British Journal of Psychology*, Monograph Supplements, Vol. 1, pp. 82, 1913.

their chance occurrence after a lapse of time; and (b) the chance items of the first tend to persist on account of their recitation."¹⁴

3. RECOGNITION AND RECALL

Although many studies have been made to ascertain recognition and recall, yet time and space permit at present an account of only three of these. E. K. Strong (1913) measured the effect of time interval upon recognition. His material consisted of series in each of which there were 40 common English words. From each of these series a second series of 20 words each was drawn at random. This second series acted as the exposure list. The first limit was given to five subjects for recognition after certain time intervals. Then the subjects tried to select the exposure list from these. In all, the experiment included 14 intervals and 15 measures for each interval. And, here again, the curve of forgetting approximates that of Ebbinghaus.¹⁵

E. F. Mulhall (1915) writes: "The results of experimental studies in memory may lead to practical applications. We have long known that the value of a single presentation is greater in recognition than in recall, and, we may add, that the difference in the value of repetitions is greater for material with meaning and less for material without meaning." More significant to the teacher, perhaps, is another remark of this experimenter, when she states: "The difference between recall and recognition is greatest when the material is rich with association and becomes less, the fewer the associations in the material."¹⁶

E. M. Achilles (1920) concludes, as a result of experimental studies in recall and recognition that, "To reproduce or recall what one has seen or heard is different from

¹⁴ Brown, W.: To What Extent is Memory Measured by a Single Recall? *Journal of Experimental Psychology*, Vol. 6, pp. 377-382, 1923.

¹⁵ Strong, E. K.: The Effect of Time-Interval upon Recognition Memory. *Psychological Review*, Vol. 20, pp. 339-372, 1913.

¹⁶ Mulhall, E. F.: Experimental Studies in Recall and Recognition. *American Journal of Psychology*, Vol. 26, pp. 217-228, 1915.

recognizing it as something previously seen or heard when it is presented again."¹⁷

Briefly, then, experimentation shows a difference between recognition and recall; the value of a single presentation is greater in recognition than in recall; and, finally, the difference in the value of repetitions is more significant for meaningful than meaningless material.

4. INFLUENCE OF THE TYPES OF IMAGERY ON RETENTION

Let us now consider the influence of types of imagery on the ability to retain. Obviously, this phase of the literature on retention has long interested experimenters, for as early as 1894, Kirkpatrick, following hard on the heels of Ebbinghaus, performed his study to determine the relative values of visual, auditory, and motor impressions on memory. His subjects were in the primary school and college. Having chosen 30 names of common objects, these were arranged in three parallel columns. The experimenter pronounced the words in the first column at the rate of one every two seconds; those in the second column he exposed on the board, one at a time, and then erased; then the words in column three were exposed at the same rate. After exposing a whole column, the observers tried to write as many of the words as they could remember. Moreover, the subjects attempted to rewrite the words after a three-day interval. Another phase of the experiment consisted in presenting orally 30 different words. Kirkpatrick finds that the subjects remember the written names better than the spoken names. Anyhow, the retention after three days is unusually interesting, for the names of the ten common objects which are pronounced to the observers and then written by them, are remembered by one-seventh as many of them as they could if the words were visualized. The numbers of the auditory and visual cases are in the ratio of .91 to 6.29.¹⁸

¹⁷ Achilles, E. M.: *Experimental Studies in Recall and Recognition*. *Archives of Psychology*, No. 44, pp. 80, 1920.

¹⁸ Kirkpatrick, E. A.: *An Experimental Study of Memory*. *Psychological Review*, Vol. 1, pp. 602-9, 1894.

V. A. C. Henmon (1912) made an experiment to test "the influence of auditory, visual-auditory, and visual-auditory-motor (articulatory) presentation on retention." The six subjects used three kinds of material—concrete nouns, two-place numbers, and nonsense syllables. Repetitions varied from one to three. The method employed is that of the amount retained (*Methode der behaltenen Glieder*). By rotating on a drum, each series was exposed three-quarters of a second with an interval of one and one-half seconds between each member of the series. In the visual presentation the students read the series from the drum and then wrote down as many of them as they remembered; in the auditory presentation, the subjects closed their eyes and listened to the reading of the stimuli; then, in the visual-auditory presentation, the pupils looked at the stimuli while the experimenter read aloud; while in the visual-auditory-motor presentation, the subjects both looked and read aloud the lists. Inasmuch as the results show a marked superiority of the auditory over the visual, they are not in accord with Kirkpatrick's experiment. Not only is the auditory better than the visual presentation for retention but the superior standing holds true for all the materials. The returns from the visual-auditory method reveal a superiority to the visual in 87 per cent. of the 54 cases. More important, probably, is Henmon's general conclusion, that all methods of presentation are superior to the visual, alone, and that this remains relatively unchanged for one, two, or three presentations. Finally, he concludes: "Superiority with one form of presentation means practically the same degree of superiority with others."¹⁹

Although many experiments have made contributions to the influence of types of imagery on retention, yet a short account of only one more is given here. That is L. C. Seibert's (1927) study to learn the relative efficiency of different methods of learning French vocabulary, namely, (1) learning silently, then relearning after intervals of two, ten, and

¹⁹ Henmon, V. A. C.: *The Relation between Mode of Presentation and Retention*. *Psychological Review*, Vol. 19, pp. 76-96, 1912.

forty-two days; (2) learning aloud and relearning after the same intervals as in (1); and (3) learning aloud with an immediate recall. The subjects were from Goucher College. As a final summary of the conclusions, the author writes: "In all cases the best averages are made when the words have been learned aloud."²⁰

Clearly, then, these three experiments, to measure the influence of the types of imagery on retention, are not in agreement as to the conclusions. While Kirkpatrick found that the visual impression is the best for retention, Henmon and Seibert state that auditory is superior to visual imagery. At any rate, learning aloud in our crowded schools presents many complications. Perhaps, further experimentation will help to settle the conflicting claims.

5. RELATION OF INTELLIGENCE TO RETENTION

A. R. Abelson (1911) attempted to measure the mental ability of 88 boys and 43 girls in eight London County Schools for Defectives. By turning to the conclusions, we find the correlation between memory for names and intelligence, as measured by the ability to perform tasks, to be .18 for girls and .19 for boys; the correlations between intelligence and the estimated ability in arithmetic is .30 for girls and .32 for boys. A slight relationship exists between intelligence and the ability to retain, and, at the same time, the relationship is slightly closer for the boys.²¹

S. Watt (1913) conducted a study to secure the relation of intelligence and memory. Thirty-four children, ages 11 and 13 years, served as his subjects. He finds a correlation between the estimated intelligence and the immediate test is .59, while after two days it is .74.²²

²⁰ Seibert, L. C.: An Experiment in Learning French Vocabulary. *The Journal of Educational Psychology*, Vol. 18, pp. 294-309, 1927.

²¹ Abelson, A. R.: The Measurement of Mental Ability of Backward Children. *British Journal of Psychology*, Vol. 4, pp. 268-314, 1911.

²² Watt, S.: The Qualitative Investigation of Higher Mental Processes. *British Journal of Psychology*, Vol. 6, pp. 109-133, 1913.

As a final experiment under the present sub-heading, let us consider that of A. L. Lee (1925). Her subjects were 310 third to eighth grade children in the New York City schools. General intelligence was measured by the composite scores on forms A and B of the National Intelligence Tests. Four kinds of material were used—pictures of familiar objects, simple nouns, geometrical forms, and nonsense syllables. The writer states: "The coefficients of correlation between general intelligence and the recall of pictures, and general intelligence and recall of words, after a 30-second interval are .58 and .55, respectively. The correlations between general intelligence and recall of these two kinds of material after a 24-hour interval are .46 and .47, respectively. Similarly, the correlation between recall of pictures in the relearning test and intelligence (.53) is higher than the correlation between intelligence and recall of pictures in the 24-hour interval test."²³

In summary, the investigations of Abelson, Watt, and Lee agree that there is a positive relationship between intelligence and ability to retain. Therefore, in this day of X, Y, and Z grouping and the prominence given to IQ's, we can feel reasonably sure that the higher the intelligence, the better are the chances that what we teach is remembered.

6. RELATION OF RATE OF LEARNING TO RETENTION

Two German investigators, G. E. Müller and F. S. Schumann (1894), made a study to ascertain the relation of quickness of learning to the retentiveness. In learning nonsense syllables, they found that the subjects who learn a series in the shortest time also relearn the same after an interim of 24 hours in the shortest time. Thus, the fast learner is doubly blessed, for he not only learns quickly but if he forgets can relearn in a short time.²⁴

E. N. Henderson (1903), likewise, tried to find the effect of the rate of learning on retention. His material was pre-

²³ Lee, A. L.: *An Experimental Study of Retention and Its Relation to Intelligence*. Psychological Monographs, Vol. 34, pp. 45, 1925.

²⁴ Müller, G. E., und Schumann, F. S.: *Experimentelle Beiträge zur Untersuchung des Gedächtnisses*. Zeit. f. Psych. d. Sinnesorgane, Vol. 6, pp. 81-190; 257-339, 1894.

sented but once, therefore it was not completely learned. "Those who learn quickest," says Henderson, "retain in general a larger percentage of what they have learned. Individuals tend to keep the same rank in power to learn in the various tests. In power to retain, the ranking was widely variant. When the material of the two tests was similar it corresponded to a significant extent."²⁵

W. H. Pyle (1911) conducted a study at the University of Missouri, in which he tested 12 subjects—seniors and graduate students—to determine the rate of learning a passage in nature study. The time interval was 24 hours. According to this investigation, poor health, loss of sleep, and overwork necessitate a longer time to learn and a correspondingly poorer retention. Furthermore, the results show that the fast learner is the more accurate learner. "We have also tested," says Pyle, "the retention of memory of large classes a month after matter was given, and found the chances to be at least three out of four that students would maintain the same rank in long retention that they had in immediate reproduction. This fact has an important educational significance. It means that the students who get the most out of a lecture will have the most on examination day, providing that there is no reviewing or further study."²⁶

Although E. O. Finkenbinder's (1913) experiment with nonsense syllables, after intervals ranging from 30 minutes to 72 hours, makes many contributions to retention literature, yet, we are chiefly concerned at this point with the speed of learning and remembering. The 14 observers employed the "relearning" method. By examining Finkenbinder's conclusions, we find that, "The rate of learning increases very rapidly during the first few sittings, then gradually approaches a constancy." At another place, we note, "Rapid learners may remember more than slow learners." Conse-

²⁵ Henderson, E. N.: *The Study of Memory for Connected Trains of Thought*. Psychological Review, Monograph Supplement, Vol. 5, No. 6, pp. 94, 1903.

²⁶ Pyle, W. H.: *Retention as Related to Repetition*. Journal of Educational Psychology, Vol. 2, pp. 311-321, 1911.

quently, there is a consistency between this study and the two previously mentioned.²⁷

In an experiment, D. O. Lyon (1916) attempted to measure the relation of quickness of learning to retention. For observers, he had normal subjects, state prison convicts, and asylum patients. As so frequently used, his material consisted of digits, nonsense syllables, words, prose, and poetry. The following conclusion is vital to education: "The relation of quickness of learning to retentiveness depends upon the method used of ascertaining 'retentiveness.' The different methods give opposite results, and yet, in one sense of the word, one method is as 'correct' as another." Further on we read: "An examination of over 400 'introspections' would seem to show that it does not pay to attempt to multiply the various forms of imagery. The quickest learners employ the type, or combination of types, to which they are naturally accustomed. The relation of quickness of learning to retentiveness depends upon many factors, the most important of which are method, material, and interval."²⁸

On the whole, these investigations on the relation of quickness of learning to retention agree that fast learners retain better than slow learners, and, likewise, the fast learners can relearn more quickly than slow learners. Here, indeed, we have an important contribution to education for teachers should be wide awake, looking for opportunities to supply the rapid learners with additional material. It is really a plea for homogeneous grouping, if the schools are to make the greatest provision for chances to learn for the greatest numbers of pupils.

7. EFFECT OF NUMBER OF REPETITIONS ON RETENTION

A. E. Wagner (1910) attempted to determine how many repetitions are necessary to secure mastery of facts with maximum certainty, and at the same time to learn what intervals must occur between the repetitions in order that the

²⁷ Finkenbinder, E. O.: The Curve of Forgetting. *American Journal of Psychology*, Vol. 24, pp. 8-32, 1913.

²⁸ Lyon, D. O.: The Relation of Quickness of Learning to Retentiveness. *Archives of Psychology*, No. 34, pp. 1-60, 1916.

mastery, when once secured, may be retained. In all, there were 119 subjects—children of the fifth, sixth, seventh, and eighth grades. As the correct answers were given to geography questions, the examiner wrote them upon the board. At the same time, the children wrote the answers, one to three words, on slips of paper. In the case of the fifth grade children, they practically knew the answers at the end of the fourth repetition, while the sixth, seventh, and eighth grades knew them at the end of five, four, and three repetitions, respectively.²⁹

An investigation by J. L. Eisenberg (1913) undertook to learn whether continuous repetition or repetition after an interval is more effective in memorizing spelling. In all, there are four experiments in this study. Two and three repetitions, both continuous and with intervals, were required; sometimes they were oral and sometimes written. To education, the conclusions are noteworthy, for Eisenberg writes: "This experiment shows that both in immediate results and in results at the end of the week, repetitions after an interval are more effective in memorizing spelling than continuous repetition. The experiments show an average of 9.3 per cent. in favor of the repetition after an interval."³⁰

J. A. McGeoch (1928) studied the influence of learning upon retroaction with five widely varying degrees of learning, viz., 6, 11, 16, 21, and 26 repetitions. Nonsense syllables were exposed on a memory drum at the rate of two seconds per syllable and learned by the anticipation method. Here, the method consisted of a rest and a work condition for each of the five degrees of learning. In the work condition, the interval between learning and relearning was filled by the learning of an interpolated list. Each of 10 subjects went through each condition twice in a counterbalanced practice order. Retroaction was measured in terms of the relative

²⁹ Wagner, A. E.: An Experiment to Determine the Number of Repetitions Necessary to Memorize and Retain with Maximum Certainty. Thesis, University of Pennsylvania, pp. 37, 1910.

³⁰ Eisenberg, J. L.: Experimental Studies in Spelling to Determine Whether Continuous Repetition or Repetition after an Interval is more Effective in Memorizing. Thesis, University of Pennsylvania, pp. 80, 1913.

difference between the rest and work conditions for both recall and relearning scores. In stating his conclusions, McGeoch makes very important implications, since "The relative amount of retroactive inhibition, measured in terms of both recall and relearning scores, varies inversely as the number of presentations given the material to be learned. Even lists learned to 26 repetitions, however, suffer a considerable disintegration from the interpolated lists. The tendency for retroaction to decrease as degree of learning increases applies to serial positions in the list differentially, the position of the maximum amount of inhibition shifting as degree of learning increases."²¹

To summarize, not only is there an increase in retention with an increase in the number of repetitions, but there is also a decided advantage in learning to spell to have an interval after the repetition. May not these learning conditions hold true for all, or at least some, of the school studies? At any rate, further investigations need to be made with the various classroom studies and with different repetitions in order to determine maximum learning and retention.

8. CLASSROOM RETENTION

Not only have numerous laboratory experiments in retention been carried on, but there are a few investigations that are especially designed to measure, within certain limitations, retention in actual classroom situations. As early as 1900, a committee appointed in Washington, D. C., to investigate the public schools in the district, shows that large amounts of what the children are supposed to have been taught in the grammar grades are lost after nine months. The chief examiner of the Civil Service Commission prepared the questions. In all, 1188 first year high school pupils took the tests. The average number of correct answers to 11 arithmetic questions was 58.8 per cent. The spelling examination was upon words used in answering the history questions.

²¹ McGeoch, J. A.: *The Influence of Degree of Learning upon Retroactive Inhibition*. *Psychological Bulletin*, Vol. 25, No. 3, pp. 160-161, Mar., 1928.

The words used by each pupil were counted, and, according to the results, the average number of words misspelled by each pupil ranged from 3 to 6 per cent. In history the average per cent. of correct answers to the five questions was 53.10 per cent. (ranging through 44, 48, 52, 56, and 59 for the six schools). In general, the investigating committee concluded that nine months after leaving the grades over 40 per cent. of the grammar school content cannot be recalled. The great amount of loss is amazing, yet this study is not to be strictly considered as an investigation of classroom retention, since there are no records of the scores, actually made in the grammar school, with which to compare retention and forgetting.³²

E. W. Cober (1912) made a study of high school pupils with a view of determining the extent of recollection of once familiar facts. The experimenter gave all the tests to the 1362 pupils who had not studied the subject from one to five years previously. Included in the test were 33 history and geography questions. They were given a second time over intervals varying from seven to twenty days; in one school, a second test was given after an interval of 21 days. Briefly summed up, Cober's conclusions are: "Out of the 33 questions only five were correctly answered by 75 per cent. or more of all the pupils tested in the four schools—four in the case of the boys and one in the case of the girls." Yet, in this study, as in the Washington report, there is no immediate test of the grammar grade work with which to compare the delayed returns. Clearly, this is not a study of real classroom retention.³³

Kirby (1913) attempted to measure the influence of the summer vacation on arithmetical ability in addition and division. There were 1350 subjects in the third and fourth grades

³² Report from Committee on District of Columbia under Senate Report 140, directing committee to investigate course of studies in public schools of District, with testimony, March, 1900. S. R. 711, 1st session, 56 Cong. Supplemental Report, School Examinations, April 14, 1900, S. R. 711, part 2, 56 Cong., 1st session, p. 15.

³³ Cober, E. W.: A Study of High School Pupils with a View of Determining the Extent of Recollection of Once Familiar Facts. Thesis, University of Pennsylvania, pp. 46, 1912.

of New York City. The material consisted of Thorndike "Addition Sheets." The practice in division was provided for by sheets that were devised by the experimenter on the "Remainder Division Table" plan worked out by Thorndike in his "Exercises in Arithmetic" numbers 2 and 3. Addition was practiced 75 minutes, with different distributions of time for each class. However, there were 15-minute initial periods and a 15-minute final period. Division was practiced 60 minutes, there being 10-minute initial and 10-minute final periods. The tests for retention were given in June and September, yet there was no reviewing in anticipation of the tests. For the September tests, 152 children were available for the addition, and 221 for the division, that is, these had taken all the previous tests. The giving of the tests after the summer vacation corresponded to the initial and final practice periods; namely, a 15-minute practice period for addition and a 10-minute practice period for division. Therefore, it is possible to compare the scores on both the initial and final periods of the study.

According to Kirby, the after-vacation returns for addition show that "more than one-half as much practice was required in September to regain the standing reached in the experiment before vacation as was required at that time to reach it." For the division tests, "more than three-fifths as much practice was required in September to regain the standing reached in the experiment of the previous year as was required at that time to reach it. Both in addition and division there was a great loss in ability during the summer vacation. The loss in division was greater than that in addition."²⁴

M. A. Garfinkle (1919) carried on a study to ascertain the effect of summer vacation on ability in the fundamentals of arithmetic. The material consisted of the Curtis Tests in Fundamentals, Series B. Form I was used in June, 1918, and Form II in September, 1918. There were 747 children—fifth through seventh grades—in New York City. On the whole,

²⁴ Kirby, T. J.: *Practice in the Case of School Children*. Teachers College, Contributions to Education, No. 58, pp. 96, 1913.

the returns after the summer vacation show a decrease in both speed and accuracy, with the exception of an increase in speed for addition.³⁵

D. H. Eikenberry (1923) studied the permanence of learning in certain school studies taught in high school but not continued in college. There were 34 subjects—16 men and 18 women—members of two senior classes in educational psychology. The following standard tests were given; namely, (1) Henmon, Latin Test, Vocabulary and Sentences; (2) Sackett, Ancient History Scale; (3) Van Wagenen American History, Information Scale A; (4) Barr, Diagnostic Tests in American History; (5) Minnick, Geometry Test A; (6) Starch, Physics Tests; and (7) Bell, Chemistry Test. He used the Army Alpha, Scrambled Alpha and Terman Tests to secure the intelligence ratings. Here, again, we have an experiment which does not really test retention, for Eikenberry inferred the amount known in high school, by taking the standard scores for high school pupils. According to his results, the students retain the greatest amount of American History, second highest is ancient history, and so on down with geometry, Latin, chemistry, and physics, respectively.³⁶

H. E. Jones (1923) attempted to measure the permanence of college lectures at Columbia University. His lectures embraced such topics as neural function, reasoning, feeling, etc. At the close of the lecture period, the students took the test of five questions for immediate recall. Then at intervals of one, three, and seven days, delayed permanence of learning was secured. In getting the retention, five other questions were used. "In each case," writes Jones, "the immediate recall is more than twice as efficient as the delayed recall, indicating a steep initial descent in the curve of forgetting." Not less important than this conclusion is another where he finds, for the 453 cases, a mean coefficient of .576 between immediate and delayed recall. To classroom instructors, the

³⁵ Garfinkle, M. A.: The Effect of the Summer Vacation on Ability in the Fundamentals of Arithmetic. *Journal of Educational Psychology*, Vol. 10, pp. 44-47, 1919.

³⁶ Eikenberry, D. H.: Permanence of High School Learning. *Journal of Educational Psychology*, Vol. 14, pp. 463-481, Nov., 1923.

next statement is of vital concern, "From what we know of the curve for forgetting for just learned material, it is probable that the content of a lecture is forgotten more rapidly during the lecture itself than at any time afterward." Later on, Jones writes, "Tests of delayed recall for the content of 40-minute lectures showed a rapid initial decrement, from 62 per cent. immediate to 45 per cent. after three to four days, with a slower decrement to 24 per cent. after eight weeks."⁸⁷

Retention of chemistry was studied by S. R. Powers (1924) in his tests of 349 freshmen who entered the University of Minnesota. While the largest proportion of these had finished high school chemistry on the preceding June, there was an interval of but three months. There were, however, others who had completed the school course 15 months before; then some of the subjects had not had high school chemistry for two years or more. Powers secured a standard median for his experiment by testing 1200 students who had just completed one year chemistry in high school. The scores reveal interesting facts. "Within three months after the students have left their instruction, their median is seven deciquartiles lower than that of the students just finishing the high school course. By the time one year has elapsed the median score is 12 deciquartiles lower. At the end of four years, 50 per cent. of the students are barely able to get on the surface of frequency which represents the distribution of the group. When it is recalled that the universities are decidedly selective and that there is much better chance for the more capable individuals to enter college one feels convinced that such knowledge and skills as those tested—knowledge and skills which have required many hours to acquire—are for most students almost completely lost within one to two years after instruction has ceased."

To education, and especially to chemistry instructors, the following comment of Powers is noteworthy. "These data

⁸⁷ Jones, H. E.: *Experimental Studies of College Teaching. The Effect of Examination on Permanence of Learning.* Archives of Psychology, No. 68, pp. 1-70, 1923.

indicate not only that the subject matter of chemistry which is included in this test is open to question on account of the failure of students to learn very much of it; but also that such information as the students do acquire has little or no functional value, for practically all of it passes out of mind soon after the student has severed connection with the class in which instruction in chemistry is given."³⁸

L. H. Meek (1925) experimented to determine learning and retention with 71 children at the Horace Mann Kindergarten and Nursery School of Teachers College. The ages of the subjects ranged from four through six years. While the four-year-olds learned only three words—ball, flag, and doll—which were pasted on boxes containing the object, the six-year-olds learned all six words—ball, flag, doll, lion, duck, and rose. The oldest group was taught two words at each period instead of one. Now, all the children learned each word with two consecutive correct practices. Meek's conclusions are: "All the curves show some forgetting on each period, whether it was 24 hours later or 14 days later. It would seem no matter how much children of this age overlearn a word on one day, some of them will not remember enough to recognize the word the next day. But in no case was there total forgetting at any period, something was saved at each time which contributed to the learning. Probably the most we can expect from young children is a gradual lessening of the amount forgotten by optimum distributions of periods and amount of practice. . . . Additional practice aids retention but a larger number of recognitions at one time does not bring efficient results for these children. . . . A distribution of practice making the more subtle analysis a gradual development is more efficient than concentrated practice."³⁹

M. E. Noonan (1926) conducted a study to find the influence of the summer vacation period on the school abilities

³⁸ Powers, S. R.: A Diagnostic Study of the Subject Matter of High School Chemistry. Teachers College, Columbia University Contributions to Education, No. 149, pp. 49-54, 1924.

³⁹ Meek, L. H.: Learning and Retention in Young Children. Teachers College, Columbia University Contributions to Education, No. 164, pp. 86, 1925.

of fifth and sixth grade children. In all, there were 803 pupils who formed the subjects of this investigation, yet, only 222 of these attended summer school. Noonan concludes, "The influence of the summer school in improving the abilities tested was very insignificant. In three cases, namely, language ability, reading ability, and ability to solve problems, exactly the same changes took place in the abilities of the group who did not attend summer school as in the group who did. In two other abilities, arithmetical computations and spelling, attendance at summer school prevented the slight deterioration in the S. S. group that occurred in the non-S. S. group." We find, "It also seems thoroughly sound, on the basis of this study, to eliminate in these grades (fifth and sixth) the reviews that are frequently given at the beginning of the fall term to counteract the forgetting that has been supposed to occur during the vacation period."⁴⁰

One of the very latest studies in classroom retention is that by E. H. de Weerd (1927) who measured the permanence of improvement in certain mental functions. Forty-nine fifth grade pupils in New Haven, Connecticut, supplied the subjects. The average chronological age of these children was ten years. For securing the desired evidence, the experimenter used Symbol-digit substitution, Thorndike addition, Chapman-Cook Speed Reading test, Woodworth-Wells Cancellation, a new multiplication and Same Opposite test especially arranged for this study, and a rearrangement of the Thorndike Multiplication by substitution sheet. In all, these pupils had about 260 minutes for practice. The Illinois Examination I, Form I, was given to all the pupils. The experimenter finds that, "The function which suffered most from disuse was reading." Again she learns, "The general intelligence test gives within certain limits not only a fair indication of the capacity for variability of response

⁴⁰ Noonan, M. E.: *Influence of the Summer Vacation on the Abilities of Fifth and Sixth Grade Children*. Teachers College, Columbia University Contributions to Education, No. 204, pp. 103, 1926.

but also of relative capacity for improvement, and for retention of improvement."⁴¹

As the last investigation in classroom retention, let us consider the study of G. A. Kramer (1927), in which she attempted to measure forgetting over the summer vacation in a group of 150 fifth grade children. These were pupils in the public schools of Baltimore City. To test the amount of forgetting, reading and arithmetic tests were given in June and again in September. The experimenter states that, "The children, as a group, proved fairly stable in their retention of arithmetic. In reading ability the trend is toward appreciable improvement with over 40 per cent. of the children. That the probable errors of the two coefficients of correlation of the June and September medians in both reading and arithmetic remain consistently small lends significant reliability to our findings. These children did not, as a group, manifest an amount of forgetting to be seriously reckoned with. In September they gave rather good accounting of the strength they showed in June."⁴² Therefore, in the light of the evidence of this study, as well as Dr. Noonan's no intensive reviewing is needed after the summer vacation of the arithmetical functions or reading in the grades tested.

In summing up these classroom retention experiments, we find wide variations in the amount retained. For instance, Powers finds such a large amount of chemistry is forgotten, while Noonan and Kramer secure scarcely any forgetting over the summer vacation. Doubtless, some of these differences in the amount retained are due to the grade "study," method of teaching, as well as testing retention, the observers, and length of time interval. Not only are there many educational implications resulting from these studies, but, on the other hand, there is an urgent need for more investigations in the various phases of classroom retention and forgetting.

⁴¹ de Weerd, E. H.: The Permanence of Improvement of Fifth Grade School Children in Certain Mental Functions. *Journal of Educational Research*, Vol. 16, pp. 127-131, 1927.

⁴² Kramer, G. A.: Do Children Forget During the Vacation. *Baltimore Bulletin of Education*, Vol. 6, No. 3, pp. 56-60, December, 1927.

APPENDIX

I. BIBLIOGRAPHY

A. GENERAL REFERENCES

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- BRINKLEY, S. G.: Values of the New Type Examinations with Special Reference to History. Teachers College, Columbia University Contributions to Education, No. 161, 1924.
- BROOKS, F. D.: Changes in Mental Traits with Age Determined by Annual Re-Tests. Teachers College, Columbia University Contributions to Education, No. 116, 1921.
- DEWEY, J.: Interest and Effort in Education. Houghton Mifflin Company, New York, 1913.
- HOLZINGER, K. J.: On Scoring Multiple-Response Tests. Journal of Educational Psychology, Vol. 15, 1924, pp. 445-447.
- KLAPPER, P.: The Teaching of History. D. Appleton and Company, New York, 1926.
- McHALE, K.: Comparative Psychology and Hygiene of the Over-Weight Child. Teachers College, Columbia University Contributions to Education, No. 221, New York City, 1926.
- RUCH, G. M.: The Improvement of the Written Examination. Scott, Foresman and Company, New York, 1924.
- RUGG, E. U.: A Survey of the Test Movement in History. Journal of Educational Research, Vol. 7, pp. 313-314, 1923.
- THORNDIKE, E. L.: Educational Psychology. Vol. II, Teachers College, Columbia University, New York, 1913.
- THORNDIKE, E. L.: Educational Psychology, Briefer Course, Teachers College, Columbia University, 1923.
- WOOD, B. D.: Measurement in Higher Education. Teachers College, Columbia University, New York City, 1923.
- WOODYARD, E.: The Effect of Time Upon Variability. Teachers College, Columbia University Contributions to Education, No. 216, 1926.

B. ANNOTATED BIBLIOGRAPHY ON RETENTION

- ABELSON, A. R.: The Measurement of Mental Ability of Backward Children. British Journal of Psychology, Vol. 4, pp. 268-314, 1911.
- Tested feeble-minded—88 girls and 43 boys; found correlation between memory for names and intelligence .18 for girls and .19 for boys.
- ACHILLES, E. M.: Experimental Studies in Recall and Recognition. Archives of Psychology, No. 44, pp. 80, 1920.
- Determined that reproduction, or recall of what one has seen or heard is different from recognizing it as something previously seen or heard.
- BALLARD, P. B.: Obliviscence and Reminiscence. British Journal of Psychology, Monograph Supplements. Vol. 1, pp. 82, 1913.

Experimented with 5192 elementary school children; material 34 lines from the "Ancient Mariner"; found that after 7 days interval there was a loss of 12.1 per cent.; the number of items given in a second recall is often greater than on the first recall.

BEAN, C. H.: The Curve of Forgetting. *Archives of Psychology*, No. 21, pp. 49, 1912.

Carried on experiment in the Indiana State Normal School with college sophomores; material—series of letters on screen; found curve somewhat similar to that of Ebbinghaus; the loss was rapid at first, then slow.

BELL, J. C., and McCOLLUM, D. F.: A Study of the Attainments of Pupils in United States History. *Journal of Educational Psychology*, Vol. 8, pp. 257-74, May, 1917.

Found biographical questions are more correctly answered than the dates or historic terms: boys are superior in historical ability to girls; the amount of superiority ranges from 28 per cent. in elementary schools to 31 per cent. in the high schools.

BINET, A., and HENRI, V.: La mémoire des mots et des phrases. *L'Année psychologique*, Vol. I, pp. 1-59, 1894.

Found that the greater the length of phrase and of the series of phrases the greater is the forgetting.

BOOK, W. F.: The Psychology of Skill; with Special Reference to Its Acquisition in Typewriting. University of Montana Publications of Psychology, Bulletin No. 53, Psychological Series No. 1, pp. 181, 1908.

Found that practice on the typewriter, which had been stopped for a year and five months, showed no loss of skill; there is an average gain of 103 strokes per day over the records made during the last ten regular tests.

BOURBON, B.: Influence de l'âge sur la mémoire immédiate. *Revue Philosophique*, Vol. 38, pp. 148-167, 1894.

Found that the immediate memory increases from 8 to 20 years.

BROWN, W.: Some Experimental Results in the Correlation of Mental Abilities. *British Journal of Psychology*, Vol. 3, pp. 296-322, 1910.

Experimented with 114 adults and 145 children; material—syllables and poetry; retainability determined after 24 hours.

BROWN, W.: To What Extent is Memory Measured by a Single Recall? *Journal of Experimental Psychology*, Vol. 6, pp. 377-382, 1923.

Experimented with 194 persons who wrote the names of all the states they could remember; repeated performance after half an hour; found net gain of 3 states.

BURNHAM, W. H.: Retroactive Amnesia: Illustrative Cases and a Tentative Explanation. *American Journal of Psychology*, Vol. 14, pp. 382-396, 1903.

Concluded that the fixing of an impression depends upon a psychological process; time is needed to fix an impression so that it can be reproduced after a long interval.

COBER, E. W.: A Study of High School Pupils with a View of Determining the Extent of Recollection of Once Familiar Facts. A Thesis, University of Pennsylvania, pp. 46, 1912.

Tested 1362 first year through fifth year high school pupils; gave 33 geography and history questions covering works in the grammar school; intervals—7 to 21 days; found that boys recalled better than girls.

CROSLAND, H. P.: A Qualitative Analysis of the Process of Forgetting. *The Psychological Monograph*, Vol. 29, No. 1, pp. 159, 1921.

Concluded that forgetting is the result of two somewhat reciprocal processes, 1—a process of losing details with a characteristic typifying and disintegrating of the image, and 2—a process of subjective selecting, interpolating and clarifying.

DALLENBACH, K. M.: The Relation of Memory Error to Time Interval. *Psychological Review*, Vol. 20, pp. 323-337, 1913.

Experimented with 20 observers; material—pictures; two kinds of recall required—narration and deposition—by an interrogatory of sixty questions; found that the increase in error is as great in the first 5 days as it is in the next 40; also experimented with geometrical figures.

DALLENBACH, K. M.: The Effect of Practice upon Visual Apprehension in School Children. *Journal of Educational Psychology*, Vol. 5, pp. 321-334; pp. 387-404, 1914.

Studied children in the second grade; ten-minute exercises for 17 weeks in rapid observation and reproduction of letters, digits, words, geometrical figures, etc.; found that practiced children were superior in recall and description to their unpracticed school mates, even after 50-week interval.

DEWEERDT, E. H.: The Permanence of Improvement of Fifth-Grade School Children in Certain Mental Functions. *Journal of Educational Research*, Vol. 16, pp. 127-131, 1927.

Studied 49 children in fifth grade; material—Symbol-digit substitution, Thorndike addition, Illinois Examination I, Form I, etc.; practice totaled 260 minutes; concluded "The general intelligence test gives within certain limits capacity for improvement and retention.

DOWNEY, J. E., and ANDERSON, J. E.: Retention of Skill after Lapse of Practice. *American Journal of Psychology*, Vol. 28, pp. 396-408, 1917.

Concluded there is considerable retention of capacity to maintain the processes of reading and writing after a lapse of practice for more than two years, as well as a rapid relearning and approximation of one's last record.

EBBINGHAUS H.: "Ueber das Gedächtnis." *Untersuchungen zur experimentellen Psychologie*. Leipzig, Duncker und Humbolt, 1885.

Conducted this experiment in memory by the use of nonsense-syllables and poetry; experimenter was also subject; time interval—few minutes to 30 days; gave the classical Ebbinghaus curve and laws of forgetting.

EIKENBERRY, D. H.: Permanence of High School Learning. *Journal of Educational Psychology*, Vol. 14, pp. 463-81, November, 1923.

Experimented with 34 seniors in educational psychology; secured final semester marks in high school; gave standard tests—Henmon Latin Test, Sackett Ancient History Scale, etc.; made comparison with other high school pupils; found that United States and ancient history, and geometry are remembered best, while physics, chemistry and Latin show the most forgetting; women made better marks in high school history, but men retained better.

EISENBERG, J. L.: Experimental Studies in Spelling to Determine Whether Continuous Repetition or Repetition after an Interval is more Effective in Memorizing. A Thesis, University of Pennsylvania, pp. 80, 1913.

Two and three repetitions—continuous and with intervals—of words were required, oral and written; found that repetition after an interval is more effective in memorizing spelling than continuous repetition.

FINKENBINDER, E. O.: The Curve of Forgetting. *American Journal of Psychology*, Vol. 24, pp. 8-32, 1913.

Used nonsense-syllables with 14 observers; intervals 30 minutes to 72 hours; found that rapid learners remember more than slow learners.

FINKENBINDER, E. O.: The Remembrance of Problems and of Their Solutions. A Study in Logical Memory. A Dissertation, Clark University, Worcester, Mass., 1914. Reprinted from the *American Journal of Psychology*, Vol. 25, 1914, pp. 32-81.

Experimented with 10 observers; recalls made after one to 15 months; presented 32 arithmetic problems in either a visual or an auditory fashion; concluded that "the visual image is the strikingly dominant feature of recall."

GARFINKLE, M. A.: The Effect of the Summer Vacation on Ability in the Fundamentals of Arithmetic. *Journal of Educational Psychology*, Vol. 10, pp. 44-47, 1919.

Experimented with 747 fifth through seventh grade children; material—Courtis Test in Fundamentals Series B, Forms 1 and 2; found after the summer vacation, a decrease in both speed and accuracy, with an increase in speed for addition.

GATES, A. I.: Correlations and Sex Differences in Memory and Substitution. *California University Publication in Psychology*, Vol. 1, No. 6, pp. 345-350, 1916.

Experimented with 197 students in elementary psychology for memory of visual and auditory digits, memory of verbal sense material, etc.; found low positive correlations ranging from $+0.07$ to $+0.41$; men generally have higher correlations than the women.

GATES, A. I.: Correlations of Immediate and Delayed Recall. *Journal of Educational Psychology*, pp. 489-496, 1918.

Experimented with elementary school children, grades 3-8; material—nonsense-syllables and biographies; found high positive correlations $+0.73$ to $+0.89$ between immediate and delayed recall.

GUILLET, C.: A Study of the Memory of Young Women. *Journal of Educational Psychology*, Vol. 8, pp. 65-84, 1917.

Concluded that mere retentiveness is slightly and doubtfully related to general ability; the ability to grasp logical relations and to see meanings is a considerable factor in retention.

HENDERSON, E. N.: The Study of Memory for Connected Trains of Thoughts. *Psychological Review*, Monograph Supplement, Vol. 5, No. 6, pp. 94, 1903.

Concluded that those who learn quickest retain, in general, a greater per cent. of what they have learned.

HENMON, V. A. C.: The Relation between Mode of Presentation and Retention. *Psychological Review*, Vol. 19, pp. 76-96, 1912.

Tested for the influence of visual, auditory, visual-auditory, and visual-auditory-motor presentation on retention; material—concrete nouns, two place numbers, and nonsense-syllables; found superiority with one form of presentation means practically the same degree of superiority with others.

HOLLINGWORTH, H. L.: Characteristic Differences between Recall and Recognition. *American Journal of Psychology*, pp. 532-544, 1913.

Found that when the attempted recognition took place after long intervals of time "the nonsense-syllables show a considerable loss, both from increase in series length and increase in interval."

HUNTER, W. S.: The Delayed Reaction in a Child. *Psychological Review*, Vol. 24, pp. 74-87, 1917.

Experimented with child 13 to 16 months old; child tried to recall where top had been placed.

JONES, H. E.: Experimental Studies of College Teaching. The Effect of Examination on Permanence of Learning. *Archives of Psychology*, No. 68, pp. 1-70, 1923.

Experimented with college students of Columbia University: gave lectures on topics—neural function, reasoning, feeling, etc.; tested students immediately and after intervals of few days to 8 weeks; found "rapid initial decrement, from 62 per cent. immediate to 45 per cent. after 3-4 days, with a slower decrement to 24 per cent. after 8 weeks."

KENNEDY, F.: On the Experimental Investigation of Memory. *Psychological Review*, Vol. 5, pp. 477-499, 1898.

Concluded that "the general accuracy of memory in school children increases with age."

KIRBY, T. J.: Practice in the Case of School Children. *Teachers College, Columbia University Contributions to Education*, No. 58, pp. 96, 1913.

Experimented with 1350 third and fourth grade children; material—addition, division, etc.; tested for retention in June and September; found that the children had gained in the June test, but over the summer vacation the median loss in columns added correctly was 17 per cent., the median loss in division was 21 per cent.

KIRKPATRICK, E. A.: An Experimental Study of Memory. *Psychological Review*, Vol. 1., pp. 602-609, 1894.

Attempted to determine the relative retentive values of visual, auditory, and motor impressions and to discover the relation existing between recall and recognition; conducted study in primary school and college, material—words and objects; found the visual qualities are remembered better than the sounds and objects just imagined; when the experiment was repeated with 180 normal school girls, it was found that "the power to recognize appears to be for the average student nearly double that of recall."

KRAMER, G. A.: Do Children Forget During the Vacation? *Baltimore Bulletin of Education*, Vol. 6, No. 3, December 1927, pp. 56-60.

Tried to determine the forgetting over the summer vacation with 150 fifth-grade children in the Baltimore City School; she concluded "These Children did not as a group manifest an amount of forgetting to be seriously reckoned with."

LEE, A. L.: An Experimental Study of Retention and Its Relation to Intelligence. *Psychological Monographs*, Vol. 34, No. 4, pp. 45, 1925.

Used 310 New York school pupils, grades 3 through 8, materials—pictures, nouns, geometric forms, and nonsense-syllables, gave National Intelligence Tests, Forms A and B; correlations between age and retention vary from -0.20 to $+0.48$; correlations between pictures and general intelligence and between words and general intelligence are .46 and .47, respectively.

LUH, C. W.: The Conditions of Retention. *Psychological Monographs*, Vol. 31, No. 3, pp. 87, 1922.

Experimented with adult subjects; material—nonsense-syllables; interval varied from 20 minutes to 2 days, found that "the effect of the increase in the degree of learning upon the amount of retention manifests the phenomenon of diminished returns."

LYON, D. O.: The Relation of Quickness of Learning to Retentiveness. Thesis, Columbia University; also found in the *Archives of Psychology*, No. 34, pp. 1-60, 1916.

Used normal subjects from Barnard College and Columbia University, state prison convicts and asylum patients—426 in all, material—digits, nonsense-syllables, words, prose, and poetry; found the women are superior to the men in their retention of digits, nonsense-syllables, and poetry, while the men equal the women in the case of words; for prose the men seem to do better than women; the correlation between memory and class standing was 0.31; the greater the interest the better is the retention; girls from 10 to 24 learn more quickly than boys; those who learn quickly remember the longest.

LYON, D. O.: Memory and the Learning Process. Warwick and York, Baltimore, Maryland, pp. 76-154, 1917.

Found that with any material, excepting digits, those who learn the quickest forget the least.

MABAI, S.: The Effects of Repetition upon Retention. *Journal of Experimental Psychology*, Vol. 5, pp. 147-151, 1922.

Conducted the study with 66 subjects; material—nonsense-syllables; interval of 24 hours; found "that each three repetitions saved approximately one repetition after twenty-four hours."

McGEOCH, J. A., and WHITLEY, P. L.: The Recall of Observed Material. *Journal of Educational Psychology*, Vol. 17, pp. 419-425, 1926.

Undertook to measure the recall of briefly observed material with college sophomores, men and women; material—Binet object card, photographs, etc.; intervals of 30, 60, 90, and 120 days; found that "after 120 days, 45.3 per cent. of the material had been forgotten."

McGEOCH, J. A.: The Influence of Degree of Learning upon Retroactive Inhibition. *Psychological Bulletin*, Vol. 25, No. 3, pp. 160-161, March, 1928.

Studied the influence of degree of learning upon retroactive inhibition with five widely varying degrees of learning; material—nonsense-syllables; found "that the relative amount of retroactive inhibition, measured in terms of both recall and relearning scores, varies inversely as the number of presentations."

MEEK, L. H.: A Study of Learning and Retention in Young Children. Teachers College, Columbia University Contributions to Education, No. 164, pp. 86, 1925.

Studied children four; five, and six years old; material—words pasted on boxes; times interval—one, two, four, nine, and fourteen days; found “that no matter how much children of this age overlearn a word on one day, some of them will not remember enough to recognize the word the next day. But in no case was there total forgetting at any period.” This study contains an excellent bibliography.

MEUMANN, E.: *The Psychology of Learning. An Experimental Investigation of the Economy and Technique of Memory.* Translated by J. W. Baird, D. Appleton and Company, pp. 393, 1913.

In this comprehensive study the author states, “We remember only what we have apprehended attentively and with the intention of remembering. Bright children retain twice as much as dull children of the same age.” This contains an excellent bibliography.

MULHALL, E. F.: *Experimental Studies in Recall and Recognition.* American Journal of Psychology, Vol. 26, pp. 217-228, 1915.

Concluded that “the difference between recall and recognition is greatest when the material is rich with associations and becomes less the fewer the associations in the material.

MÜLLER, G. E., and SCHUMANN, F. S.: *Experimentelle Beiträge zur Untersuchung des Gedächtnisses.* Zeit. f. Psycho. d. Sinnesorgane, Vol. 6, pp. 81-190; 257-339, 1894.

Discovered that in the learning of nonsense-syllables, the quick learner not only learns the quickest, but if he forgets can relearn it in a short time; found less forgetting than Ebbinghaus.

MYERS, G. C.: *Recall in Relation to Retention.* Journal of Educational Psychology, Vol. 5, pp. 119-130, 1914.

Had 332 subjects, material—words; found that there is a decided gain in final recall as a result of intervening recalls without re-presentation; frequent reviews are needed while the material is fresh in the mind.

MYERS, G. C.: *Delayed Recall in History.* Journal of Educational Psychology, Vol. 8, pp. 275-288, 1917.

Attempted to have pupils recall previously learned history; found that 40 per cent. was lost between the time of study and that of recall after a year.

MYERS, G. C., and C. E.: *Reconstructive Recall.* American Journal of Psychology, Vol. 27, pp. 493-506, 1916.

Had 6 students attempt to reconstruct from memory, one or more selections which they once could quote; found about 50 per cent. of the original selection was added after the first recall.

NOONAN, M. E.: *Influence of the Summer Vacation on the Abilities of Fifth and Sixth Grade Children.* Teachers College, Columbia University Contributions to Education, No. 204, pp. 103, 1926.

Experimented with 803 fifth and sixth grade St. Louis children; materials—Trabue Completion-Test, Language Scales B and J, etc.; concluded reviews in the fall are frequently unnecessary.

NORSWORTHY, N.: *Acquisition as Related to Retention.* Journal of Educational Psychology, Vol. 3, pp. 214-218, 1912.

Tested 83 students in Educational Psychology for their rate of learning and their ability to recall immediately and after an interval of 30 days; material—1200 words of a German-English vocabulary; found correlation between rate of learning and retention as high as + 0.41 for the first test and + 0.50 for the second test.

PIERON, H.: *Recherches experimentales sur les phénomènes de mémoire*. *L'Année psychol*, Vol. 19, pp. 91-193, 1913.

Experimented with various species of animal life; found a relation between rapidity of the fixation and rate of forgetting.

POWERS, S. R.: *A Diagnostic Study of the Subject Matter of High School Chemistry*. Teachers College, Columbia University Contributions to Education, No. 149, pp. 49-54, 1924.

Tested at the University of Minnesota, high school students in retention of chemistry; intervals of 3 months to 17 years; concluded, "That such knowledge and skills as those tested . . . are for the most students almost completely lost within one or two years after instruction has ceased."

PYLE, W. H.: *Retention as Related to Repetition*. *Journal of Educational Psychology*, Vol. 2, pp. 311-321, 1911.

Tested twelve students in the University of Missouri; material—passage of poetry; intervals—24 hours and a month; found that rapid learners are more accurate and retain more; the chances are three out of four that the students will maintain the same rank in retention after long intervals as they did on immediate retention.

RADOSSAWLJEWITSCH, P. R.: *Das Fortschreiten des Vergessens mit der Zeit*. Göttingen, Druck der Dieterich'schen Univ.—Buchdruckerei, pp. 197, 1905.

Had 8 lines of poetry, nonsense-syllables, etc.; studied to the point of two perfect recitals; rehearsed after various intervals up to 20 days; found that after 24 hours the students had lost about one-third.

REED, H. B.: *Associative Aids; Their Relation to Learning; Their Relation to the Theory of Thought and to Methodology in Psychology*. *Psychological Review*, Vol. 25, pp. 128-155, 1918.

Learned that words which are quickly learned are slowly forgotten because of association.

Report from Committee on District of Columbia under Senate Rule 140, directing committee to investigate course of studies in public schools of district, with testimony March 23, 1900. Senate Report 711, part 1, 56 Congress, April 14, 1900. Senate Report 711, part 2, 56 Congress, 1st session, pp. 15.

1188 first year high school pupils in Washington, D. C., were examined in common school branches; learned that "nine months after leaving the grades, over 40 per cent. of the grammar school content could not be recalled."

SEIBERT, L. C.: *An Experiment in Learning French Vocabulary*. *Journal of Educational Psychology*, Vol. 18, pp. 294-309, 1927.

Attempted to learn the relative efficiency of different methods of learning French vocabulary; material—lists of one- two- three- and four-syllable words; found that studying aloud is the best method and that it has a double advantage, greater accuracy and more persistent retention."

SHELOW, S.: *Individual Differences in Incidental Memory*. *Archives of Psychology*, No. 64, pp. 77, 1923.

Concluded, "More items are recognized than recalled. The difference in recall and recognition memory is in part dependent on the richness of associations formed."

STRONG, E. K.: The Effect of Time-Interval upon Recognition Memory. *Psychological Review*, Vol. 20, pp. 339-372, 1913.

Investigated with 5 subjects; materials—words, read aloud, arithmetic problems solved after each list of words; interval—15 seconds to 42 days; found where recognition is allowed immediately after presenting a list of 20 words, 84 per cent. of them will be identified correctly with a feeling of absolute certainty, while only 10 per cent. can be recognized after an interval of 7 days."

STRONG, E. K.: The Factors Affecting a Permanent Impression Developed through Repetition. *Journal of Experimental Psychology*, Vol. 1, pp. 319-338, 1916.

Used advertisements; intervals—a day, a week, a month, and sixteen weeks; concluded that "as you increase the number of advertisements which are seen at any one time you decrease the effectiveness of the permanent impression of any of them."

STRONG, M. H., and E. K.: The Nature of Recognition Memory and of the Localization of Recognitions. *American Journal of Psychology*, Vol. 27, pp. 341-362, 1916.

Gives an explanation of why we recognize.

SWIFT, E. J.: Memory of a Complex Skillful Act. *American Journal of Psychology*, Vol. 16, pp. 131-133, 1905.

Experimented with two subjects in tossing balls; right and left hands used; concluded, "The nervous system has forgotten little or nothing, and that whatever loss of skill, the strangeness of the movements during the first and second trials indicated was chiefly muscular."

SWIFT, E. J.: Relearning a Skillful Act. An Experimental Study in Neuro-Muscular Memory. *Psychological Bulletin*, Vol. 7, pp. 17-19, 1910.

Repeated the experiment in ball tossing to learn how much time was required to regain former skill; interval of more than six years; found that eleven days were required to regain the skill of 42 days' practice.

TAIT, W. D.: The Effect of the Psycho-Physical Attitude on Memory. *Journal of Abnormal Psychology*, Vol. 8, pp. 10-37, 1913.

Concluded, "Impressions which harmonize with the existing attitude stand a good chance of being well remembered. Psychological attitudes then select from impressions those that are remembered by way of conscious reproduction."

THORNDIKE, E. L.: The Relation between Memory for Words and Memory for Numbers, and the Relation between Memory over Short and Memory over Long Intervals. *American Journal of Psychology*, Vol. 21, pp. 487-488, 1901.

Gave 5 lists of 12 words each; interval—20 hours; found a correlation between brief and long retention in the case of unconnected material to be about .9. "The relation between the retention of the effects of an experience for one or two minutes and their retention for one or two days seems to be one of the closest yet measured in human nature."

THORNDIKE, E. L.: Memory for Paired Associates. *Psychological Review*, Vol. 15, pp. 122-138, 1908.

Experimented with 22 adults; material—120 sets of 10 English meanings of German words; learned that “30 hours of study, plus 8 hours of testing, give command of 1030 words for 3 days and of 620 of them for 42 days.”

THORNDIKE, E. L.: *The Permanence of School Learning*. School and Society, Vol. 15, pp. 625-627, June, 1922.

Measured 189 first-year students in a law school; material—algebra questions; compared their scores with those of other high school pupils; interval in great majority of cases—four or five years; found “the effect of the four years or more from college entrance in September to April of the first year in law school is thus approximately a reduction from the ability to do four or five of such tasks to the ability to do three.”

TROW, W. C.: *Recall vs. Repetition in the Learning of Rote and Meaningful Material*. American Journal of Psychology, Vol. 40, No. 1, pp. 112-116, 1928.

Performed experiment with the aid of graduate students in educational psychology; material—series of digits, nouns, descriptive paragraph; found “abstract nouns are about equal to concrete in immediate recall, but after one day are forgotten to about the same extent that the concrete nouns are after fifteen weeks.”

TSAI, C.: *Comparative Study of Retention Curves for Motor Habits*. Comparative Psychology Monographs, Williams and Wilkins Co., Baltimore, Maryland, pp. 29, October, 1924.

Experimented with 70 adults, etc.; material—stylus Maze Habit; found high degree of individual variability.

TSAI, L. S.: *The Relation of Retention to the Distribution of Relearning*. Journal of Experimental Psychology, Vol. 10, pp. 30-39, 1927.

Experimented with 102 college students in the Fuh Tan University, Shanghai; material—ten paired associates—English and Chinese; interval—1 to 14 days; found that returns exhibited the characteristics of negative acceleration.

WAGNER, A. E.: *An Experiment to Determine the Number of Repetitions Necessary to Memorize and Retain with Maximum Certainty*. Thesis, University of Pennsylvania, pp. 37, 1910.

Experimented with 119 fifth-, sixth-, seventh- and eighth-grade children; material—geography questions; found rapid decrease in last repetitions.

WATT, S.: *The Qualitative Investigation of Higher Mental Processes*. British Journal of Psychology, Vol. 6, pp. 109-133, 1913.

Experimented with 34 children, 11 and 13 years of age; material—nonsense-syllables; interval—immediate and 2 days; found correlation between estimated intelligence and immediate memory of .59 and after delay of 2 days of .74.

WOODY, C.: *Scores Made by Seniors on the Holtz Algebra Scales Compared with Scores Made by High School students Taking Algebra*. School and Society, Vol. 16, pp. 303-6, September, 1922.

Tested 488 high school students in Michigan; materials—Holtz Equation and Formula and Problem Scales; found “that the seniors had retained a relatively large amount of the knowledge of the more formal aspect of algebra but a comparatively small amount of the more complex aspect of the subject.”

II. RETENTION TESTS USED IN THIS INVESTIGATION

VI B

TEST IN AMERICAN HISTORY—BALTIMORE, MARYLAND

DEvised BY JANET BASSETT

Pupil's Score

Total Time

Name Age Today.....
yrs. mos.

Sex Grade School

City State Date

Teacher.....

Directions for the Pupil

1. Do not turn this page until told to do so.
2. Do not hurry, but keep working constantly. You will have plenty of time to try all the questions. You will do much better if you take your time and think before you write.
3. There are four parts in this test. When you finish one part, look up to the board and secure the "TIME." Write the number of minutes which are given on the board at the end of the part where it is marked to do so. If time is called before you finish, record the minutes, and go on with the next part at once.
4. When you are told to turn the page, do so. Read the directions carefully for Part I. Begin to answer the questions at once.
5. Go on with Part II as soon as you finish Part I.

Part I.—True-False

Directions: Some of the statements below are true and some are false. Put + on the line at the left of a statement if the statement is true. Put — on the line at the left of a statement if it is not true. Go through the list of statements quickly, answering those of which you are sure, then go back and study the more difficult statements. Answer these if you think that you know them.

- + 1. Maryland was founded by Lord Baltimore.
- 2. Governor Leonard Calvert won the friendship of the native tribes of Indians.
- 3. Maryland took no part in the Revolutionary War.
- 4. Anthony Stewart burned the Peggy Stewart at Annapolis.
- 5. Charles Carroll of Carrollton signed the Declaration of Independence.
- 6. The "Old Defenders" kept the British from capturing Baltimore.
- 7. John Eager Howard took command of a ship during the War of 1812.
- 8. Maryland was divided on the slavery question.
- 9. Baltimore is the oldest city in Maryland.
- 10. A study of the great men of Maryland helps us to be better citizens.
- 11. The Northwest Territory belonged to Virginia, Massachusetts, and Connecticut, but they gave it up to Congress to be sold to pay the war debts.

- 12. Napoleon sold us Florida.
- 13. The Oregon Country was divided between the United States and England.
- 14. Texas won her freedom from Mexico.
- 15. There are less people in the New England States than in the Southern States.
- 16. The United States has grown to be a world power.
- 17. The Samoan Islands lie along the coast of Alaska.
- 18. The United States desired to get Hawaii because of the fine victrola records that are made there.
- 19. Spain did everything which she could to improve the conditions in her colonies.
- 20. Since the Americans have had charge of the Philippines, the people there have become more civilized.
- 21. We secured Porto Rico at the close of the Spanish-American War.
- 22. The Panama Canal connects the Gulf of Mexico and the Atlantic Ocean.
- 23. The health conditions of the Panama Canal Zone have been improved since the Americans have been in control.
- 24. Thomas Jefferson wrote the Monroe Doctrine.
- 25. The Monroe Doctrine says Europe can plant no more colonies on the globe.
- 26. The Monroe Doctrine was used in settling the dispute between Mexico and the United States.
- 27. At the close of the World War many countries recognized the value of the Monroe Doctrine.
- 28. Germany did not believe in training the body.
- 29. Alsace and Lorraine were secured by Germany at the end of the Franco-Prussian War.
- 30. Germany was anxious to get colonies so that she could increase her trade.
- 31. The Berlin to Bagdad railroad was finished before the World War began.
- 32. Archduke Francis Ferdinand was killed by a Frenchman.
- 33. Germany marched her troops through Belgium.
- 34. The Belgians were led by the Brave King Albert.
- 35. The Germans captured Paris.
- 36. Germany sank many ships with her submarines.
- 37. Many Americans were killed at Chateau-Thierry.
- 38. Food became much cheaper while the World War was going on.
- 39. The Treaty of Peace was made in 1919.
- 40. Alsace and Lorraine were given to France at the close of the World War.
- 41. Wilson's League of Nations was warmly received by all people.

Time in minutes. _____.

Part II.—Completion

Directions: Some important words have been omitted from the following statements. Write in the blank the word that best completes the meaning of the sentence. Each blank represents one word.

1. In 1649, Maryland granted *freedom* of worship to all Christians throughout the colony.
2. Francis Scott Key wrote the _____.
3. The capital of Maryland is _____.

4. The first land which the United States secured west of the Mississippi was _____.
 5. We purchased Alaska from _____.
 6. Porto Rico was given to us at the close of the _____ War.
 7. The man who made the Panama Canal Zone healthy was Dr. _____.
 8. The _____ was written to keep the European nations from colonizing in America.
 9. The Germans violated _____ neutrality.
 10. The United States entered the World War on the side of the French and _____ in the year _____.
 11. The leading American at the Peace Conference was _____.
- Time in minutes. _____.

Part III.—Multiple-Choice

Directions: In each sentence select the one word or phrase which you think makes the statement true. Underline this answer.

1. The first settlement in Maryland was made at (a) Annapolis, (b) Towson, (c) Baltimore, (d) *St. Mary's*.
2. The rich country gentlemen of colonial Maryland lived in (a) manors, (b) cabins, (c) forts, (d) cities.
3. A famous sea fighter during the War of 1812 was (a) Paca, (b) Gist, (c) Decatur, (d) Chase.
4. Baltimore is called the "Monumental City" because (a) it has a bronze statue of Lafayette, (b) it was the first city to build a notable monument to George Washington, (c) it has many statues in parks and squares, (d) it has a statue in honor of Columbus.
5. The Thirteen Colonies were (a) in the central part of North America, (b) along the Atlantic Ocean, (c) along the Gulf of Mexico, (d) west of the Great Lakes.
6. Texas came into the Union in (a) 1803, (b) 1819, (c) 1845, (d) 1846.
7. The population of the United States has spread out beyond the Appalachians because (a) there were too many farms in the East, (b) there was plenty of corn and wheat in the Southern States, (c) the taxes were too high in New York, (d) the immigrants wished to get farm land.
8. Florida is valuable to us because it supplies us with (a) Christmas trees, (b) an outlet on the Pacific Ocean, (c) control of the harbor of New Orleans, (d) bananas, lemons, and oranges.
9. The boundary line between Texas and Mexico is (a) Mississippi River, (b) Gulf of Mexico, (c) Rio Grande River, (d) Colorado River.
10. The first land which we secured in the Pacific was (a) Alaska, (b) Porto Rico, (c) Philippines, (d) Cuba.
11. The Panama Canal was opened to vessels in (a) 1907, (b) 1914, (c) 1920, (d) 1924.
12. The Panama Canal belongs to (a) England, (b) France, (c) United States, (d) Colombia.
13. The Monroe Doctrine was used to settle (a) the boundary dispute between Venezuela and British Guiana, (b) the War of 1812, (c) the Indian troubles, (d) the Spanish-American War.
14. Germany taught that (a) Might makes Right, (b) the world is flat, (c) England is the greatest nation in the world, (d) the United States is a land of war.

15. The man who did so much to make Germany a strong nation was (a) the Sultan of Turkey, (b) Napoleon, (c) Bismarck, (d) William Tell.
16. Wilson issued his Proclamation of Neutrality because (a) Germany did us no harm, (b) we believed in war, (c) we were not interested in war, (d) we wanted to stay out of European troubles.
17. America entered the war because (a) London was destroyed, (b) Germany carried on a terrible submarine warfare, (c) we wanted to have some excitement, (d) we wanted to get land in Europe.
18. The great general of the French during the World War (a) Pershing, (b) Lloyd George, (c) Lincoln, (d) Foch.
19. We took our troops to France in (a) submarines, (b) aeroplanes, (c) vessels guarded by transports, (d) captured French Ships.
20. The Armistice was signed in (a) 1914, (b) 1900, (c) 1918, (d) 1921.
21. The "Unknown Soldier" is buried at (a) Mt. Vernon, (b) Washington, (c) Baltimore, (d) Arlington.

Time in minutes. _____.

Part IV.—Essay

Directions: Select any three of the following problems about which you know the most important facts. Write four statements on each subject in the space which is left beneath the topic. Think before you write.

1. What have we done to honor the great men and events of Maryland History?
2. What are the advantages of the Panama Canal?
3. How did the German people feel about their country and toward war?
4. What did America do to help win the World War?

Time in minutes _____.

VIA

TEST IN AMERICAN HISTORY—BALTIMORE, MARYLAND

DEvised BY JANET BASSETT

Pupil's Score

Total Time

Name Age Today.....
yrs. mos.

Sex Grade School

City State Date

Teacher.....

Directions for the Pupil

1. Do not turn this page until told to do so.
2. Do not hurry, but keep working constantly. You will have plenty of time to try all the questions. You will do much better if you take your time and think before you write.
3. There are four parts in this test. When you finish one part, look up to the board and secure the "TIME." Write the number of

minutes which are given on the board at the end of the part where it is marked to do so. If time is called before you finish, record the minutes, and go on with the next part at once.

4. When you are told to turn the page, do so. Read the directions carefully for Part I. Begin to answer the questions at once.

5. Go on with Part II as soon as you finish Part I.

Part I.—True-False

Directions: Some of the statements below are true and some are false. Put + on the line at the left of a statement if the statement is true. Put — on the line at the left of a statement if it is not true. Go through the list of statements quickly, answering those of which you are sure, then go back and study the more difficult statements. Answer these if you think that you know them.

- + 1. The Romans failed to keep out the German barbarians.
- 2. The German hunters were tall, strong-looking men with golden hair and blue eyes.
- 3. The wife of the German barbarian took care of the house and children, and tilled the soil.
- 4. The German tribes lived in cities.
- 5. The kings and generals of the barbarians were chosen by vote.
- 6. The Assembly discussed questions bearing upon the welfare of the German tribes.
- 7. The wives of the warriors were afraid of war.
- 8. Siegfried was the hero of the Germans.
- 9. The German tribes moved eastward over Europe.
- 10. The Huns were friendly with the Romans.
- 11. The Goths captured Rome.
- 12. Alaric, the leader of the Goths, died and was buried in Italy.
- 13. Charlemagne was so weak that the boundaries of his country were greatly reduced while he was emperor.
- 14. Clovis refused to accept the Christian religion.
- 15. The German barbarians were lovers of art and education.
- 16. The Moors invaded Spain.
- 17. The Moors were a danger to Christianity.
- 18. The Moors were ignorant and uncultured.
- 19. King Ferdinand and Queen Isabella drove the Moors out of Spain.
- 20. England received its name from the Angles, one of the German tribes which conquered Britain.
- 21. The Angles and Saxons swept away the language of Britain.
- 22. England was so far away from Europe that no Christian missionaries ever visited it.
- 23. King Alfred drove all the raiding Danes out of England.
- 24. Alfred was not interested in education.
- 25. William the Conqueror defeated Harold at the Battle of Hastings.
- 26. All the Normans who came to England began to speak the Anglo-Saxon language.
- 27. William the Conqueror built many schools for the English.
- 28. King John was a kind king whom his subjects all loved.
- 29. The Great Charter has helped to create the democratic freedom of the English people.
- 30. The chief motive of the Crusades was religious.
- 31. King Richard the Lion-Hearted refused to go on a Crusade.
- 32. Millions of lives and much treasure were spent in the crusading expeditions to the East.

- 33. The Crusades helped to do away with learning.
- 34. The ideals of the knight were high and fine.
- 35. Men engaged in a certain trade formed a guild to secure rights.
- 36. Everybody could join a guild.
- 37. All cities in the Middle Ages belonged to the king.
- 38. The monks copied many books.
- 39. The monks made the Christian religion a great moral power.
- 40. The architecture of the American churches does not resemble that of the Moorish mosques.
- 41. No paintings or statues were made during the Middle Ages.

Time in minutes. _____.

Part II.—Completion

Directions: Some important words have been omitted from the following statements. Write in the blank the word that best completes the meaning of the sentence. Each blank represents one word.

1. The German tribes crossed the *Rhine* and the *Danube*.
2. The Germans were driven into the Roman Empire by the _____.
3. Clovis was a great king of the _____.
4. _____ was the great Christian missionary to the tribes beyond the Rhine.
5. The father of the English navy was _____.
6. The lords forced King John to sign the _____.
7. The Turks captured _____ in 1453.
8. The _____ was the head of the Church during the Middle Ages.
9. The Crusades helped to break up the _____ system.
10. Gutenberg invented the _____.
11. The first great poem in the English language was written by _____.

Time in minutes. _____.

Part III.—Multiple-Choice

Directions: In each sentence select the one word or phrase which you think makes the statement true. Underline this answer.

1. The German barbarians worshipped (a) *the powers of nature*, (b) God, (c) Jupiter, (d) Druids.
2. The ruling body of the German tribes was (a) Parliament, (b) Congress, (c) the Assembly of Freeman, (d) Senate.
3. Rome was conquered in (a) 44 B. C., (b) 100, (c) 378, (d) 476.
4. The German tribes searched for new homes because they (a) wanted to become Christians, (b) needed more territory, (c) wanted to get to Africa, (d) desired to live in a cold climate.
5. The Vandals settled in (a) England, (b) Africa, (c) Greece, (d) Spain.
6. Alfred improved his kingdom by (a) gathering all the best laws into one book, (b) fighting the Huns, (c) going on a Crusade, (d) teaching the French language.
7. The Moors were (a) Christians, (b) Greeks, (c) Mohammedans, (d) Germans.

8. The Normans conquered England and influenced (a) the language, buildings, and mode of life, (b) the religion, (c) discovery of America, (d) King Arthur.
9. The motto of the Crusades was (a) "In this sign thou shalt conquer," (b) "On to Rome," (c) "I have suffered," (d) "It is the will of God."
10. The Crusades were a turning point in history because (a) the Christians finally captured and held Jerusalem, (b) Richard the Lion-Hearted was taken prisoner by his enemies, (c) the compass was invented, (d) European life was changed.
11. The peasants or common people, of the Middle Ages (a) fought in the tournaments, (b) did not own land as our farmers do, (c) were fed and clothed by the nobles, (d) were well educated.
12. The Merchants' Guilds were begun (a) to protect the tradesmen from dishonesty, (b) to get more wages, (c) to secure shorter hours, (d) to elect the king.
13. The centers of progress in the Middle Ages were (a) manors, (b) thatched huts, (c) Rome, (d) free cities.
14. One of the richest and most beautiful cities of the Middle Ages was (a) Athens, (b) London, (c) Rome, (d) Florence.
15. The monks lived in monasteries in order to (a) stop the constant warfare, (b) to get away from the wicked world, (c) help the lords, (d) enjoy the comforts of living.
16. The monasteries were (a) great workshops, (b) large libraries containing thousands of books, (c) free gymnasiums, (d) orphan asylums.
17. During the Middle Ages, education was for a long time (a) controlled by the Danes, (b) accepted by the Jutes, (c) kept alive by the monasteries, (d) stopped by the Crusades.
18. One of the great inventions of the Middle Ages was (a) matches (b) compass, (c) steam engine, (d) steamboat.
19. The Revival of Learning stirred up the people of Europe to (a) build free high schools, (b) accept Christianity, (c) write books of their own, (d) fight.
20. Michael Angelo was a (a) sculptor and painter, (b) monk, (c) Spaniard, (d) writer.
21. The Great painter of the Madonna was (a) Dante, (b) William the Conqueror, (c) Raphael, (d) Leonardo Da Vinci.

Time in minutes. _____.

Part IV.—Essay

Directions: Select any three of the following problems about which you know the most important facts. Write four statements on each subject in the space which is left beneath the topic. Think before you write.

1. Why did the German barbarians succeed in conquering the Romans?
2. What did the Moors have which they could teach to Europeans?
3. Why were the men who went on the Crusades different when they returned to their homes in Europe?
4. What have we today that came from the Middle Ages?

Time in minutes. _____.

VII B

TEST IN AMERICAN HISTORY—BALTIMORE, MARYLAND

DEvised BY JANET BASSETT

Pupil's Score

Total Time

NameAge Today.....
yrs. mos.

SexGradeSchool

CityStateDate

Teacher.....

Directions for the Pupil

1. Do not turn this page until told to do so.
2. Do not hurry, but keep working constantly. You will have plenty of time to try all the questions. You will do much better if you take your time and think before you write.
3. There are four parts in this test. When you finish one part, look up to the board and secure the "TIME." Write the number of minutes which are given on the board at the end of the part where it is marked to do so. If time is called before you finish, record the minutes, and go on with the next part at once.
4. When you are told to turn the page, do so. Read the directions carefully for Part I. Begin to answer the questions at once.
5. Go on with Part II as soon as you finish Part I.

Part I.—True-False

Directions: Some of the statements below are true and some are false. Put + on the line at the left of a statement if the statement is true. Put — on the line at the left of a statement if it is not true. Go through the list of statements quickly, answering those of which you are sure, then go back and study the more difficult statements. Answer these if you think that you know them.

1. The majority of the people of the Thirteen Colonies were English.
- 2. The Scotch-Irish settlers were the great Indian fighters and marksmen of America.
- 3. The American colonists quickly got rid of all their old-world customs.
- 4. Down to the end of the colonial period many of the houses were made of roughly dressed logs.
- 5. The colonists imported all of their clothes from England.
- 6. In the southern colonies, sleighing and skating were the favorite pastimes.
- 7. In New England the schoolhouse came next after the church and blockhouse.
- 8. Among the early colonies Maryland and Rhode Island set the example of religious toleration.
- 9. No manufacturing was carried on in the colonies.
- 10. The mail of the early colonists was carried by postmen on horseback or in stagecoach.
- 11. The representative type of government in the New England Colonies was similar to the Virginia House of Burgesses in every way.

- 12. The colonists had little chance to practice self-government because of the power of the royal governors in all of the colonies.
- 13. The Navigation Acts forced the colonists to bring all goods to America in their own or English vessels.
- 14. The Writs of Assistance were very much like our search warrants.
- 15. The Stamp Act was an old law made years before, which George III decided to enforce upon the Americans.
- 16. The Stamp agents were made to shout, "Liberty, property, and no stamps."
- 17. Pitt was a great favorite with the colonists.
- 18. The Americans could get tea from England cheaper than they could smuggle it from Holland.
- 19. The great orators of the colonists were Jefferson, Washington and Paul Revere.
- 20. General Gage was sent to Boston with four regiments.
- 21. The First Continental Congress met in Boston.
- 22. The Battle of Lexington was fought on April 19, 1775.
- 23. Bunker Hill was defended by Putnam, Stark, Greene, and Warren.
- 24. The Second Continental Congress met in Philadelphia.
- 25. George Washington was made commander-in-chief of the American army.
- 26. A pamphlet called "Common Sense" was written by Adams.
- 27. Benjamin Franklin was the author of the Declaration of Independence.
- 28. Burgoyne surrendered to General Gage at Saratoga.
- 29. John Eager Howard was a Maryland hero of the Revolution.
- 30. At the close of the Revolutionary War, the Treaty of Peace was signed at Paris, 1783.
- 31. The Gulf of Mexico was agreed upon as our southern boundary in the Treaty of 1783.
- 32. The Continental Congress governed simply by common consent.
- 33. The Articles of Confederation gave Congress the power to compel the states to supply the needed troops.
- 34. The making of the Ordinance of 1787 was one of the wisest acts of the Congress of the Confederation.
- 35. Washington was the president of the Constitutional Convention.
- 36. Thomas Jefferson was the author of the Constitution.
- 37. The Constitution says that each state shall have the same number of Senators.
- 38. The people liked the Constitution because it had a Bill of Rights when adopted in 1788.
- 39. Washington urged us to help the foreign nations since Lafayette had helped us during the Revolution.
- 40. Mr. X., Mr. Y., and Mr. Z. were Americans sent to win the friendship of France.
- 41. The Alien and Sedition Acts hastened the downfall of the Federalist party.

Go over your list of statements again carefully.

Write the number of minutes required to do this part. _____ minutes.

Begin to answer Part II at once.

Part II.—Completion

Directions: Some important words have been omitted from the following statements. Write in the blank the word that best completes the meaning of the sentence. Each blank represents one word.

1. *Cornwallis* surrendered at Yorktown.
2. One important part of every colonial home was the great _____, the only means of heating.
3. George III turned the people of England against him by trying to bribe the members of _____.
4. The "Circular Letter" was penned by _____.
5. Franklin tried to help us by asking aid from the King of _____.
6. The "_____ of _____" states "that all men are created equal."
7. _____ went from door to door in Philadelphia trying to get money to carry on the Revolutionary War.
8. _____ won the Mississippi as our western boundary.
9. Washington was inaugurated in the city of _____.
10. The First Secretary of the Treasury was _____.
11. Washington knew that aiding France meant war with _____.

Go over Part II again and try to answer any statements you have omitted.

Record time here. _____ minutes.

Go on with Part III.

Part III.—Multiple-Choice

Directions: In each sentence select the one word or phrase which you think makes the statement true. Underline this answer.

1. George Washington was born in the state of (a) New York; (b) Maryland; (c) *Virginia*; (d) Massachusetts.
2. The early English colonists settled along the (a) James River; (b) Colorado River; (c) Mississippi River; (d) Columbia River.
3. In the early colonial days the most common mode of travel was by (a) horse; (b) foot; (c) stagecoach; (d) boat and river.
4. We inherited from England the following right of all Englishmen: (a) freedom of speech and press; (b) right to organize minutemen; (c) trial by admiralty courts; (d) representation without taxation.
5. The Stamp Act Congress was held in (a) Boston; (b) New York; (c) Philadelphia; (d) Baltimore.
6. The Port Bill closed the port of (a) Charleston; (b) Boston; (c) Richmond; (d) Philadelphia.
7. Home manufacturing was helped by the (a) Daughters of Liberty; (b) smuggling; (c) Hat Act; (d) Intolerance Act.
8. "I rejoice that America has resisted" was said by (a) Washington; (b) Franklin; (c) Pulaski; (d) Pitt.
9. One of the Maryland signers of the Declaration of Independence was (a) Lee; (b) McHenry; (c) Charles Carroll of Carrollton; (d) Sherman.
10. The French King promised to send us supplies after the battle of (a) Trenton; (b) Saratoga; (c) Long Island (d) Camden.
11. Our soldiers were drilled at Valley Forge by (a) Greene; (b) Warren; (c) Hessians; (d) Steuben.

12. The last of the States to agree to the Articles of Confederation was (a) Maryland; (b) Rhode Island; (c) Georgia; (d) Delaware.
13. The Constitutional Convention met in (a) 1492; (b) 1620; (c) 1776; (d) 1787.
14. A stronger government was urged by (a) Patrick Henry; (b) Benedict Arnold; (c) George Washington (d) Daniel Morgan.
15. The Ordinance of 1787 applied to (a) Maryland; (b) United States; (c) North Carolina; (d) Northwest Territory.
16. "The Father of the Constitution" was (a) Madison; (b) Sherman; (c) Hancock; (d) Adams.
17. The "Ship of State" is (a) Old Ironsides; (b) Constitution of the United States; (c) Bill of Rights; (d) State of Pennsylvania.
18. Our commerce is controlled by (a) Congress; (b) Secretary of the Navy; (c) the President; (d) Supreme Court.
19. "We, the people of the United States" are the opening words of (a) Patrick Henry's speech; (b) Circular Letter; (c) Constitution; (d) Washington's Farewell Speech.
20. It was thought wise to select the following place for our national capital: (a) Mount Vernon; (b) Cambridge; (c) Annapolis; (d) Washington.
21. Washington's Foreign Policy was (a) to stay out of European struggles; (b) to send the fighting nations money; (c) to enter into their wars; (d) to help them to make their peace treaties.

Go over Part III again.

Record time here. _____ minutes.

Go on with Part IV.

Part IV.—Essay

Directions: Select any three of the following problems about which you know the most important facts. Write four statements on each subject in the space which is left beneath the topic. Think before you write.

1. How were social differences shown in colonial days?
2. Why was the First Continental Congress the greatest meeting of great Americans yet held?
3. Why were the Articles of Confederation so weak?
4. What were Alexander Hamilton's plans for paying off our debts?

Look over Part IV again. Make any necessary corrections.

Record time here. _____ minutes.

VII A

TEST IN AMERICAN HISTORY—BALTIMORE, MARYLAND

DEvised BY JANET BASSETT

Pupil's Score

Total Time

NameAge Today.....
yrs. mos.

SexGradeSchool

CityStateDate

Teacher.....

Directions for the Pupil

1. Do not turn this page until told to do so.
2. Do not hurry, but keep working constantly. You will have plenty of time to try all the questions. You will do much better if you take your time and think before you write.
3. There are four parts in this test. When you finish one part, look up to the board and secure the "TIME." Write the number of minutes which are given on the board at the end of the part where it is marked to do so. If time is called before you finish, record the minutes, and go on with the next part at once.
4. When you are told to turn the page, do so. Read the directions carefully for Part I. Begin to answer the questions at once.
5. Go on with Part II as soon as you finish Part I.

Part I.—True-False

Directions: Some of the statements below are true and some are false. Put + on the line at the left of a statement if the statement is true. Put — on the line at the left of a statement if it is not true. Go through the list of statements quickly, answering those of which you are sure, then go back and study the more difficult statements. Answer these if you think that you know them.

- + 1. The Revolutionary War gave us our independence on the land.
- 2. The Articles of Confederation could not control our commerce.
- 3. Hamilton strongly objected to Jay's Treaty.
- 4. For a long time the Barbary pirates in northern Africa preyed on the commerce of Christian nations.
- 5. We lost the war with the Barbary pirates.
- 6. The Napoleonic Wars stopped all American commerce.
- 7. One of the causes of the War of 1812 was that the British searched American vessels.
- 8. The Embargo Act allowed our vessels to trade with foreign ports.
- 9. The "Constitution" won a victory over the "Guerriere."
- 10. The British burned Baltimore and attacked Washington.
- 11. Francis Scott Key wrote "The Star-Spangled Banner."
- 12. The first tariff act was proposed by Thomas Jefferson.
- 13. Thomas Jefferson was very democratic.
- 14. We purchased Louisiana in 1803.
- 15. Spain sold us Louisiana.
- 16. We wanted Louisiana in order to secure an outlet to the Pacific Ocean.
- 17. Florida was explored and settled by Spain.
- 18. Florida was used as a naval base by England in 1812.
- 19. Napoleon objected to the Florida Cession.
- 20. Mexico granted large tracts of land in Texas to settlers from the United States.
- 21. When Mexico abolished slavery she said no more slaves could enter her territory.
- 22. The United States and several European nations recognized Texas as an independent Republic.
- 23. We had trouble with Mexico over a boundary.
- 24. Andrew Jackson was the hero of Vera Cruz.
- 25. Lewis and Clark helped us to strengthen our claim to Oregon.
- 26. We secured the Oregon Territory from Spain.
- 27. The "Oregon Trail" is a famous route leading to the Gulf of Mexico.

- 28. The West was rapidly settled after the discovery of gold in California.
- 29. Few immigrants have gone out beyond the Appalachians.
- 30. The Indians of the Oregon region welcomed the White Man.
- 31. The life of the pioneer was an easy one since the forests supplied plenty of food.
- 32. Democracy is encouraged by frontier life.
- 33. Internal improvements have helped to develop our American life.
- 34. The acquisition of so much land in the West helped to do away with the slavery disputes.
- 35. New England is a great manufacturing section.
- 36. The Industrial Revolution has put hundreds of people out of work.
- 37. Agriculture is the principal industry of the South.
- 38. Slavery improved the social conditions in the South.
- 39. Before the Civil War there was a lack of public schools in the southern states.
- 40. The invention of the steamboat made our lives more comfortable.
- 41. The Erie Canal stopped the trade between the West and the South.

Go over your list of statements again carefully.

Write the number of minutes required to do this part. _____ minutes.

Begin to answer Part II at once.

Part II.—Completion

Directions: Some important words have been omitted from the following statements. Write in the blank the word that best completes the meaning of the sentence. Each blank represents one word.

- I. A Trade Convention was held at *Annapolis*.
- 2. _____ calmly said to the crowd: "If you use such striking arguments, I must retire."
- 3. The hero of New Orleans was _____.
- 4. The two kinds of tariff are _____ and _____.
- 5. _____ proposed the Compromise Tariff of 1833.
- 6. The leader of the Anti-Federalist Party was _____.
- 7. The French negotiators who arranged the Louisiana Purchase were _____ and Marbois.
- 8. The "Pathfinder" was _____.
- 9. Mexico claimed that the boundary line between Mexico and Texas was the _____.
- 10. The Industrial Revolution has brought the _____ system to America.
- 11. The industrial growth of the _____ was largely dependent on "King Cotton."

Go over Part II again and try to answer any statements you have omitted.

Record time here. _____ minutes.

Go on with Part III at once.

Part III.—Multiple-Choice

Directions: In each sentence select the one word or phrase which you think makes the statement true. Underline this answer.

1. According to the Constitution the commerce of our country is controlled by (a) the states; (b) *Congress*; (c) governor of the state; (d) Secretary of State.
2. England seized our sailors for her ships on the ground that they were (a) deserters from the English army; (b) good fighters; (c) subjects of England; (d) enemies of England.
3. The policy of the Barbary Pirates was (a) to make the nations pay them tribute to sail the Mediterranean Sea; (b) to attack our vessels on the Pacific; (c) to pay toll to the Europeans; (d) to trade with the Dutch East Indies.
4. "Don't give up the ship" was said by (a) Hull; (b) Jones; (c) Decatur; (d) Lawrence.
5. Perry won a great victory on (a) Lake Erie; (b) Gulf of St. Lawrence; (c) Lake Champlain; (d) Potomac River.
6. The War of 1812 ended in (a) 1846; (b) 1814; (c) 1821; (d) 1824.
7. Tariff is (a) a veto; (b) a debate; (c) an amendment; (d) money paid on imported goods.
8. The Tariff of Abominations was opposed by (a) Washington; (b) Hamilton; (c) Calhoun; (d) Lincoln.
9. The election of 1800 was (a) won by Monroe; (b) decided by the House of Representatives; (c) opposed by the Republicans; (d) favored by Burr.
10. An important effect of the Louisiana Purchase was that it (a) helped Jefferson to continue his doctrine of "strict construction"; (b) made Jefferson very unpopular; (c) gained the friendship of Spain; (d) gave the United States control of the Mississippi.
11. We purchased Louisiana in (a) 1803; (b) 1819; (c) 1800; (d) 1846.
12. Zebulon Pike explored (a) Mississippi River; (b) Columbia River; (c) Florida; (d) southwestern part of the Louisiana Purchase.
13. We purchased Florida because we (a) needed more land; (b) desired to help Spain; (c) wanted to get rid of the trouble caused by the runaway slaves; pirates, and robbers; (d) could use it to protect the Panama Canal.
14. The Gadsden Purchase cost us (a) \$15,000,000; (b) \$7,500,000; (c) \$7,200,000; (d) \$10,000,000.
15. The battle cry of the Mexican War was (a) "Remember the River Raisin"; (b) "Don't give up the ship"; (c) "Remember the Alamo"; (d) "Fifty-four forty or fight."
16. One of the great hindrances to western development was (a) invention of the steamboat; (b) danger from the Indians; (c) increase in immigration; (d) discovery of gold.
17. The last frontier was (a) along the Pacific coast; (b) along the Gulf of Mexico; (c) on the banks of the Mississippi; (d) at the eastern base of the Rockies.
18. The Transcontinental Railroad was built (a) to connect the East and West; (b) to increase our exports; (c) to give work to the unemployed; (d) to satisfy speculators.
19. The Industrial Revolution is (a) a complete change in education; (b) a decrease of the tariff rates; (c) a political upheaval; (d) a change from hand to machine manufacture.

20. The Atlantic Cable was laid by (a) Edison; (b) Bell; (c) Field; (d) Marconi.
21. A great American writer was (a) Patrick Henry; (b) Henry Hudson; (c) Dred Scott; (d) Henry Wadsworth Longfellow.

Go over Part III again and try to answer any statements you have omitted.

Record time here. _____ minutes.

Go on with Part IV.

Part IV.—Essay

Directions: Select any three of the following problems about which you know the most important facts. Write four statements on each subject in the space which is left beneath the topic. Think before you write.

1. How did we gain our freedom on the sea?
2. What was the tariff policy of the United States to 1860?
3. Why was the Louisiana Purchase the greatest event of Jefferson's administration?
4. How has the Industrial Revolution improved American life?

Look over Part IV again. Make any necessary corrections.

Record time here. _____ minutes.

VIII B

TEST IN AMERICAN HISTORY—BALTIMORE, MARYLAND

DEvised BY JANET BASSETT

Pupil's Score

Total Time

Name Age Today.....
yrs. mos.

SexGradeSchool

CityStateDate

Teacher.....

Directions for the Pupil

1. Do not turn this page until told to do so.
2. Do not hurry but keep working constantly. You will have plenty of time to try all the questions. You will do much better if you take your time and think before you write.
3. There are four parts in this test. When you finish one part, look up to the board and secure the "TIME." Write the number of minutes which are given on the board at the end of the part where it is marked to do so. If time is called before you finish, record the minutes, and go on with the next part at once.
4. When you are told to turn the page, do so. Read the directions carefully for Part I. Begin to answer the questions at once.
5. Go on with Part II as soon as you finish Part I.

Part I.—True-False

Directions: Some of the statements below are true and some are false. Put + on the line at the left of the statement if the statement is true. Put — on the line at the left of a statement if it is not true.

104 RETENTION TESTS USED IN THIS INVESTIGATION

Go through the list of statements quickly, answering those of which you are sure, then go back and study the more difficult statements. Answer these if you think that you know them.

- + 1. The first negro slaves were brought to North America in 1619.
- 2. Many of these slaves worked on cotton plantations.
- 3. There is only one reference in the Constitution to slavery.
- 4. The Ordinance of 1787 prohibited slavery in the Thirteen Colonies.
- 5. Maine came into the Union as a free state.
- 6. According to the Missouri Compromise, slavery was forever prohibited in the Louisiana Purchase.
- 7. Henry Clay was a great peacemaker.
- 8. The Wilmot Proviso was gladly accepted by the Southerners.
- 9. A strict fugitive slave law was provided by the Compromise of 1850.
- 10. Webster delivered a famous speech on the Seventh of March.
- 11. Harriet Beecher Stowe wrote Uncle Tom's Cabin.
- 12. Calhoun proposed the Kansas-Nebraska Bill.
- 13. Kansas came into the Union as a slave state.
- 14. Chief Justice Taney declared that Dred Scott could become a citizen of Missouri.
- 15. Douglas won the debates which took place between Lincoln and himself.
- 16. Lincoln won the presidential election of 1860.
- 17. Seven states seceded from the Union before Lincoln was inaugurated.
- 18. Alexander H. Stephens of Georgia was elected President of the Confederacy.
- 19. Buchanan is known as the "Irresolute" because he was so timid.
- 20. Slavery was beneficial in every way to the southern states.
- 21. John Brown favored slavery.
- 22. Westward expansion was one of the remote causes of the Civil War.
- 23. "On to Richmond" was the slogan of the Confederacy.
- 24. The first blood shed during the Civil War was in Baltimore.
- 25. Colonel Robert E. Lee was the commander of the Confederate army.
- 26. The Union made no attempt to blockade the southern ports.
- 27. During the Civil War, much hard fighting was done in Virginia.
- 28. Grant was made commander-in-chief of all the Union armies.
- 29. Sherman's army marched in parallel columns through Georgia.
- 30. Stonewall Jackson won the Battle of Gettysburg.
- 31. The Monitor and Merrimac captured New Orleans.
- 32. Lee surrendered at Appomattox Court House.
- 33. Lincoln was shot by John Wilkes Booth.
- 34. The Thirteenth Amendment gave the negro the right to vote.
- 35. The Carpet-Bag government made the reconstruction more unbearable than the war itself.
- 36. The Ku Klux Klan was composed of freed men.
- 37. There were many political scandals during the administration of Grant.
- 38. The First Continental Railway was finished in 1869.
- 39. The Homestead Act of 1862, hindered the development of the West.

—40. The present policy of the United States government in dealing with the Indians is to help them to become citizens and to look after themselves.

—41. The Mormons settled in California.

Go over your list of statements again carefully.

Write the number of minutes required to do this part. _____ minutes.

Begin to answer Part II at once.

Part II.—Completion

Directions: Some important words have been omitted from the following statements. Write in the blank the word that best completes the meaning of the sentence. Each blank represents one word.

1. One of the compromises of the *Constitution* proposed that three-fifths of the slaves he counted in making up the number of *Representatives* and in dividing the direct taxes among the states.
2. The Ordinance of 1787 was made by the _____ which received the power to do so by the Articles of Confederation.
3. The Missouri Compromise was proposed by _____.
4. Garrison published the famous Boston journal, _____.
5. The Compromise of _____ proposed that California be admitted as a _____ state.
6. The population and resources of the _____ were greater than those of the _____ during the Civil War.
7. _____ said to Jackson; "General, you have fared better than I, for you have lost only your left arm, while I have lost my right."
8. The negro received the right to become a citizen of the United States by the _____ Amendment.
9. The breaking up of the plantation system was beneficial to the _____.
10. _____ came into general use to make up for the scanty rainfall.
11. The Tuskegee Institute was founded by _____.

Go over Part II again and try to answer any statements you have omitted.

Record time here. _____ minutes.

Go on with Part III at once.

Part III.—Multiple-Choice

Directions: In each sentence select the one word or phrase which you think makes the statement true. Underline this answer.

1. The first negroes were brought to (a) *Jamestown*; (b) St. Mary's; (c) Plymouth; (d) St. Augustine.
2. The importation of negroes to this country was to be stopped after (a) 1620; (b) 1808; (c) 1766; (d) 1812.
3. "If any one desires to know the leading object of my life, the preservation of the Union will furnish him the key," was said by (a) Washington; (b) Lincoln; (c) Clay; (d) Webster.

106 RETENTION TESTS USED IN THIS INVESTIGATION

4. The Compromise of 1850 is known as (a) Ordinance of the Northwest Territory; (b) Bill of Rights; (c) Dred Scott Decision; (d) Omnibus Bill.
5. The Underground Railroad was (a) a real railroad; (b) an underground passage; (c) a chain of the homes of abolitionists where fleeing slaves might find refuge; (d) the Southern Pacific Railroad.
6. The abolitionists (a) favored slavery; (b) elected Jefferson Davis to be president of the Confederacy; (c) favored the Dred Scott Decision; (d) demanded that slavery be done away with.
7. Squatter sovereignty was (a) proposed by Lincoln in his Emancipation Proclamation; (b) denounced by Calhoun; (c) set forth in the Kansas-Nebraska Bill; (d) favored by the Union.
8. The Capital of the Confederacy was (a) Richmond; (b) Savannah; (c) Vicksburg; (d) Charleston.
9. During the Civil War the aristocratic class in England (a) was on the side of the Union; (b) favored the South and was not unwilling to see the Union overthrown; (c) sent plenty of food to the Confederacy; (d) recognized the independence of the Confederacy.
10. New Orleans was captured by (a) Grant; (b) Thomas; (c) Beauregard; (d) Farragut.
11. Lincoln's Emancipation Proclamation became effective (a) 1862; (b) January 1, 1863; (c) 1865; (d) April 19, 1861.
12. The turning point of the Civil War was at (a) Gettysburg; (b) First Battle of Bull Run; (c) Chancellorsville; (d) Vicksburg.
13. The Thirteenth Amendment gave the slave the right to (a) freedom; (b) citizenship; (c) vote; (d) fight.
14. The Carpet-Baggers were (a) northern adventurers; (b) bags; (c) congressmen; (d) returned Confederate soldiers.
15. Hayes did much to lessen the bitterness resulting from the war and the reconstruction period by (a) favoring the Congressional Plan of Reconstruction; (b) helping the Ku Klux Klan; (c) appointing a southerner as his Postmaster-General and making a tour of the South; (d) impeaching Johnson.
16. The supreme obstacle to the development of the Far West was (a) the absence of transportation facilities; (b) Civil War; (c) Homestead Act; (d) the Indians.
17. The greatest engineering feat in America before the building of the Panama Canal was the construction of (a) Erie Canal; (b) Northern Pacific Railroad; (c) Brooklyn Bridge; (d) First Continental Railroad.
18. A great leader in our Indian Wars was (a) Fremont; (b) Santa Anna; (c) General Custer; (d) Bowie.
19. Attempts to prevent the waste of natural resources were definitely undertaken by (a) Roosevelt; (b) Adams; (c) Monroe; (d) McKinley.
20. Our backwoods have been removed by (a) sheep raising; (b) better farming; (c) telegraph and radio; (d) peace.
21. The western farmer is protected by (a) immigration; (b) seclusion; (c) protection of transportation rates; (d) the airplane.

Go over Part III again and try to answer any statements you have omitted.

Record time here. _____ minutes.

Go on with Part IV.

Part IV.—Essay

Directions: Select any three of the following problems about which you know the most important facts. Write four statements on each subject in the space which is left beneath the topic. Think before you write.

1. How did the extension of slavery into the territories become the dominant issue in our national life?
2. What was the Union strategy of the Civil War?
3. How was the South reconstructed after the Civil War?
4. Why was there such a rapid movement west after 1865?

Look over Part IV again. Make any necessary corrections.

Record time here. _____ minutes.

VIII A

TEST IN AMERICAN HISTORY—BALTIMORE, MARYLAND

DEvised BY JANET BASSETT

Pupil's Score

Total Time

Name Age Today.....
 yrs. mos.

Sex Grade School

City State Date

Teacher.....

Directions for the Pupil

1. Do not turn this page until told to do so.
2. Do not hurry, but keep working constantly. You will have plenty of time to try all the questions. You will do much better if you take your time and think before you write.
3. There are four parts in this test. When you finish one part, look up to the board and secure the "TIME." Write the number of minutes which are given on the board at the end of the part where it is marked to do so. If time is called before you finish, record the minutes, and go on with the next part at once.
4. When you are told to turn the page, do so. Read the directions carefully for Part I. Begin to answer the questions at once.
5. Go on with Part II as soon as you finish Part I.

Part I.—True-False

Directions: Some of the statements below are true and some are false. Put + on the line at the left of a statement if the statement is true. Put - on the line at the left of a statement if it is not true. Go through the list of statements quickly, answering those of which you are sure, then go back and study the more difficult statements. Answer these if you think that you know them.

- + 1. The Federal government helped to build up the West by providing an easy way for homeseekers to acquire land.
- 2. The Homestead Law of 1862 permitted settlers to take up farms for themselves at a very low cost.
- 3. Soldiers and sailors of the Civil War were not allowed any of this government land.

- 4. The large orders for guns and other war materials from 1861 to 1865 increased the iron and steel industry of Pennsylvania.
- 5. The First Transcontinental Railroad was finished a few years before the Civil War.
- 6. The United States Government helps to educate the people of our country.
- 7. No one of the many inventions made in the last half century—the typewriter, telephone, phonograph, automobile—is entirely the work of a single inventor.
- 8. Bell made the first successful experiment over a few miles of wire in 1876.
- 9. Marconi is the “Wizard of Menlo Park.”
- 10. Woman and child labor is one of the problems that has been brought about by the Industrial Revolution.
- 11. The centre of population in the United States has steadily moved southward.
- 12. Business was almost paralyzed by the Panic of 1892-3.
- 13. Some of our natural resources have been wasted.
- 14. The Standard Oil Trust was formed under the leadership of Carnegie.
- 15. Many of the “Captains of Industry” have endowed schools, founded universities, and supported charities.
- 16. A corporation is a combination of capital to aid labor.
- 17. The employers have always wanted to give the employees higher wages and shorter hours.
- 18. Samuel Gompers was the head of the “American Federation of Labor.”
- 19. Capitalists are in favor of strikes.
- 20. Our later immigrants have settled in cities.
- 21. At present only a small per cent. of the Japanese can become citizens of the United States.
- 22. The Tariff of Abominations proposed to lower the average rate of tariff.
- 23. The Republicans usually try to lower tariff.
- 24. An income tax is provided by the Sixteenth Amendment.
- 25. Thomas Jefferson was the founder of the “First National Bank.”
- 26. Greenbacks were first issued during the Civil War.
- 27. A gold standard was established in 1900.
- 28. Suffrage was extended to women by the Nineteenth Amendment.
- 29. We purchased Alaska from Canada.
- 30. The acquisition of Tutuila awakened a new interest in the Hawaiian Islands.
- 31. The Americans were satisfied with Spain’s policy in Cuba.
- 32. We have a protectorate over Cuba at present.
- 33. There has never been a time in the history of our country when a dispute was submitted to arbitration.
- 34. Dr. Gorgas took care of our engineering problems in the building of the Panama Canal.
- 35. The Panama Canal is the greatest triumph of engineering in modern times.
- 36. We purchased the Virgin Islands from Denmark.
- 37. Wilson’s policy in Mexico was one of “Watchful waiting.”
- 38. Japan has always welcomed strangers.
- 39. Our aim in the World War was to secure territory.

- 40. Chateau-Thierry is the turning point of the World War.
 —41. The United States Senate accepted the League of Nations.

Go over your list of statements again carefully.

Write the number of minutes required to do this. _____ minutes.

Begin to answer Part II at once.

Part II.—Completion

Directions: Some important words have been omitted from the following statements. Write in the blank the word that best completes the meaning of the sentence. Each blank represents one word.

1. One of our great manufacturing regions is the *New England States*.
2. The change from hand to machine manufacturing is the _____.
3. _____ built a spinning mill on the Pawtucket River.
4. The "Knights of Labor" was an organization of _____.
5. An arbitration commission was appointed by President _____ to settle the anthracite coal strike of 1902.
6. Twenty years ago the most of our immigrants came from _____, Europe.
7. A Tariff Commission was created in _____ Administration.
8. _____ deposited government money in pet banks.
9. We secured the Philippines at the close of the _____ War.
10. The _____ made the first attempt to build a Panama Canal.
11. General _____ was the leader of the American forces in the World War.

Go over Part II again and try to answer any statements you have omitted.

Record time here. _____ minutes.

Go on with Part III.

Part III.—Multiple-Choice

Directions: In each sentence select the one word or phrase which you think makes the statement true. Underline this answer.

1. Our industrial progress is due to our (a) need of money; (b) poor investment; (c) development of textiles; (d) *inventions*.
2. The center of manufacturing has moved steadily westward until it is now in the state of (a) California; (b) Delaware; (c) Ohio; (d) Nebraska.
3. The Erie Canal was completed in (a) 1825; (b) 1807; (c) 1828; (d) 1850.
4. One of the serious problems in connection with the progress of industry is (a) construction of railroads; (b) industrial panics; (c) development of iron and steel; (d) Department of Agriculture.
5. Labor Unions try to secure (a) greater power for the bosses; (b) lower wages; (c) night work; (d) shorter hours for the workmen.
6. A combination of capital is (a) trust; (b) injunction; (c) employee; (d) labor organization.

7. We try to make the foreigners 100% Americans by the process of (a) restriction; (b) opposition; (c) "gentlemen's agreement"; (d) Americanization.
8. The first Tariff Act was proposed by (a) Monroe; (b) Hamilton; (c) Jefferson; (d) Burr.
9. The Tariff of 1828 was seriously opposed by (a) Massachusetts; (b) Washington; (c) South Carolina; (d) Delaware.
10. "Liberty and union, now and forever, one and inseparable" was said by (a) Calhoun; (b) Webster; (c) Clay; (d) Hayne.
11. The Fordney-McCumber Tariff was a measure of (a) Democrats; (b) Roosevelt; (c) Republicans; (d) Socialists.
12. Our first acquisition in the Pacific region was (a) Guam; (b) Samoan Islands; (c) Hawaii; (d) Alaska.
13. The Federal Reserve Act was passed in (a) 1863; (b) 1913; (c) 1918; (d) 1877.
14. The war cry of the Spanish American War was (a) Make the World Safe for Democracy; (b) All's quiet along the Potomac; (c) Remember the Maine; (d) Over the Top.
15. We won the gratitude of the Chinese by (a) sending them help in the Boxer uprising; (b) sending them missionaries; (c) returning the balance of the Boxer indemnity to China; (d) allowing Chinese to become citizens of this country.
16. We raised money during the World War by (a) building ships; (b) selling Liberty and Victory bonds; (c) sending men to France; (d) putting our money in Reserve Banks.
17. Armistice Day is (a) July 4; (b) February 12; (c) September 17; (d) November 11.
18. At the close of the World War the Treaty of Peace was signed at (a) Versailles; (b) San Mihiel; (c) Geneva; (d) London.
19. The Fourteen Points were proposed by (a) Roosevelt; (b) Harding; (c) Wilson; (d) Foch.
20. The League of Nations undertakes to (a) help the smaller nations in time of war; (b) train warriors; (c) reduce armies; and navies to the lowest point consistent with national safety; (d) keep a standing army in Germany.
21. The purpose of the World Court is (a) to supply markets for European manufactures; (b) to dethrone kings; (c) to act as a world tribunal; (d) to aid the Mohammedans capture Spain.

Go over Part III again and try to answer any statements you have omitted.

Record time here. _____ minutes.

Go on with Part IV.

Part IV.—Essay

Directions: Select any three of the following problems about which you know the most important facts. Write four statements on each subject in the space which is left beneath the topic. Think before you write.

1. What are some of the problems which the Industrial Development has brought about?
2. Why has there been a change in immigration from northwestern to southeastern Europe.
3. How has our tariff policy affected our political history?
4. How does the League of Nations seek to prevent war?

Look over Part IV again. Make any necessary corrections.

Record time here. _____ minutes.

VITA

Sarah Janet Bassett was born in Queen Anne's County, Maryland. She received her elementary education in the public schools of Baltimore County. In 1915, she graduated from the Maryland State Normal School, on which occasion she took the first honors.

In 1918 she entered The Johns Hopkins University, from which she received the Degree of Bachelor of Science with history as a major in 1923. During the summers of 1919 and 1920 she attended Columbia University Summer School. The Degree of Master of Arts was received from Johns Hopkins University in 1927.

Her teaching comprised four and a half years in Baltimore County and seven and a half years in Baltimore City, the last four of which she was a demonstration teacher at the Montebello School. During the summers of 1924 and 1925 she taught history and civics at the Homewood Demonstration School.

Her graduate studies were concentrated chiefly in the field of education. She enjoyed the privilege of studying under the direction of Dr. Florence E. Bamberger, Dr. Fowler D. Brooks, Dr. Edward F. Buchner, and Dr. David E. Weglein. She also pursued graduate work in history under Dr. J. H. Latané and Dr. E. R. Turner.

She received the George Peabody Scholarship at The Johns Hopkins University for the year 1927-1928, and that year was invited to become a member of the Pi Lambda Theta, the honorary fraternity of Graduate Women in Education.

